

November 2, 1929

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# AVIATION

*The Oldest American Aeronautical Magazine*

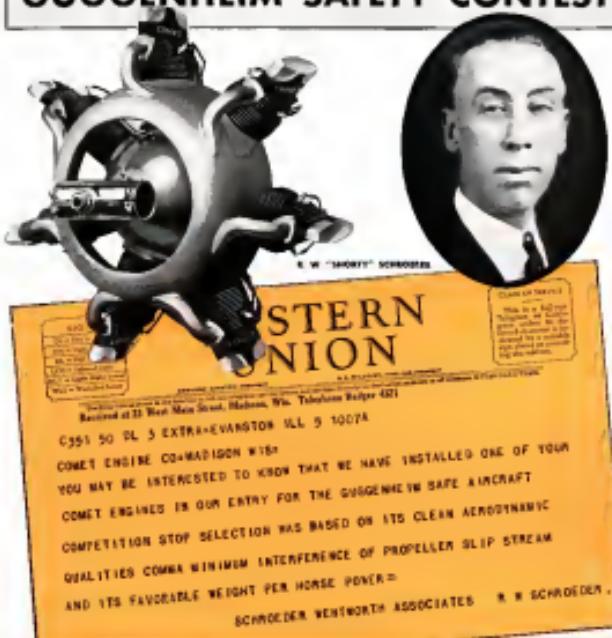


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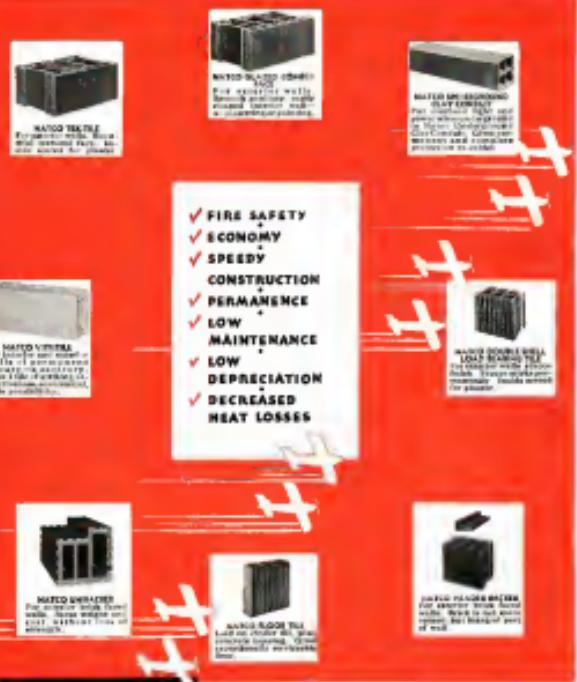
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**A  
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of the Inland is money and quiet. Ample space is provided for luggage, equipment or emergency load. The Neptune flies off easily, cruises rapidly and is extremely economical to operate. An air yacht as comfortable and comfortable as you could desire.

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November 2, 1959



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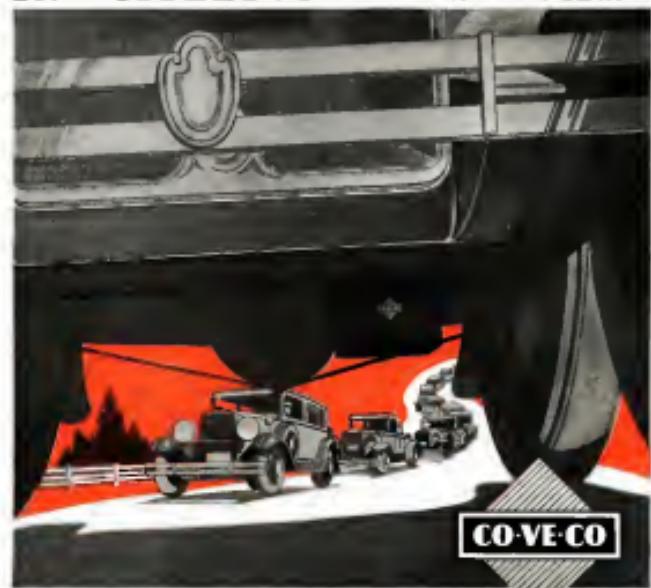
May 25th, 1929—Inner Lt. W. G. T. Williamson, U. S. N. with Curtiss Flying Boat—Anacostia, D. C. Average speed 252 miles per hour. Powered with Pratt & Whitney Wasp motor using GULFPRIDE OIL 120.

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# AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A MCGRAW-HILL PUBLICATION • Volume 11, No. 11

EDWARD F. WARNER, Editor

Volume 11, November 2, 1929 • \$2.00



## Personnel Now or Progress Later?

FOR AT LEAST two years, the aircraft industry has been the sufferer from a chronic personnel shortage. The demand for trained men, touted as engineers, production experts, or operations managers, has persistently run far ahead of the supply. Each year's output of the aeronautical engineering courses of high schools has been stepped up before the day of graduation. Companies have raided each other's staffs, which is temporarily upsetting to the factory that loses the men but natural to the course of development of the industry as a whole. It is infinitely more unusual that they have found a gold mine of personnel in the Department of Commerce, in the National Advisory Committee for Aeronautics, in the laboratories of the Army and Navy, and in the universities.

The orderly progress of American aviation, and the steady improvement of its problems, is completely within the control of the Department of Commerce. The encouragement of rapid technical development with the enforcement of all proper safety precautions is quite impossible unless the Aviation Branch is adequately staffed with competent men, and unless the turnover of its personnel is kept low enough to insure that there will be continuity of progress and that the number of new men just learning their work at any given time will be reasonably small. While these conditions have to far been met, it has been only because of the warrant that the staff has taken in a new job just starting and because of their personal loyalty to their duties. As the Department's aeronautical activities ante dots towards raising the probability of successful man made flights, personnel, such as the Aviation section of the Bureau of Standards started a few years ago and such as the National Advisory Committee, has several times experienced, becomes steadily greater.

The industry cannot move forward without constant dependence upon research, and it has been spending the

money of paying the bills for the research done by the willingness of the National Advisory Committee for Aeronautics to attack the industry's collective problems and solve them for the general good. The Committee's work has been of ample benefit. It is very poorly regulated, as Dr. Ames the Chairman pointed out at the last aeronautic conference in Langley Field, by having its more promising men status away as soon as their training has progressed to a point where they begin to be really useful.

The point need not be further labored by mentioning Wright Field, the Naval Aircraft Factory, and the conventional aero in the same way. The problem of keeping up a competent teaching staff, in particular, has become extremely desperate. The industry may rare out more and better airplanes next year by probing the best technical men without regard to where they are to be found, but the quality of the product of 1930 and the health of the market then and later, will be diametrically affected by retarding research or interfering with the training of the young engineers who should be given time to step into responsible positions a few years hence. This is a time for far sight.

The solution is not easy to find. There can be no competition with the industry in salaries. The government departments are directly limited by law and by the rules of the Civil Service Commission for uniformity of compensation. The universities are similarly limited by tradition and by the competitive management of the total funds available.

Obviously no one would suggest that any man should be tied down permanently to governmental or academic work because he has once entered it. Everyone must have a free choice of the employment that suits his best interests, interest, but at least be urged, having chosen to enter in the government service, to stay there long enough to make good returns for the value of the training

and experience that he receives during his first months. It seems to us reasonable to suggest that no civilian employee of any of the government's communication laboratories, or the Aeronomics Branch, and no engineer in communication at a university, should be approached with a view to private employment, unless the full career of his professor is the work his first love avocation, until he has lived two or three years in his governmental or institutional position. No one company can afford to adopt such a policy as this line of argument. The industry can do it effectively through joint agreement of all the large companies, and the industry collectively should gain much more than it would lose by such action.

We have discussed the subject of such a self-dragging ordinance with the principal executives of a few of the leading manufacturing companies, and the proposal has been received with enthusiasm. Now we lay it before the whole industry, as a challenge to their co-operative spirit, their interest is the promotion of aeronautical research and aeronautical education, and to their foresightedness and belief in their own future.



### Light Loading or Heavy?

**T**HE AIRPLANE OF 1929 has made a long march towards the present possibilities of flying a tri-motor with enough power. Wing area has been clipped and trimmed again and again. Wing loadings have mounted steadily, and stand now at levels unimagined during the war. Conventional commercial machines for general cross-country use are carrying a weight per unit of wing area beyond anything dared in flying planes when various international racing first began.

When a tendency to design machines itself so strength- and when it continues over a number of years almost without check, there is a strong presumption that the path being followed is wise and correct one. But a presumption is not a guarantee. It still remains to be proven that the direction in which we have been moving is the right one for all ends and under all conditions.

The Guggenheim Safe Aircraft competition has brought the topic dramatically to the fore. To the horror of some of the industry's engineers, the rules for the competition were so drawn as to put a tremendous premium upon light wing loading and, in fact, definitely to limit it to figures well below the common usage of present practice.

It is no wonder that universal agreement in holding the airplane designer finds himself impelled in both directions. Undoubtedly the use of high wing loadings and high loading speeds is conducive to economy, and to the high cruising speed which is so eagerly sought. To cruise at 120 mph. in a plane with a landing speed of 80 mph. costs several times as much per unit of distance and pay

lead us to travel at the same speed with a machine incapable of flying below 75. If airplanes could be mastered against forced landings, and against ever having to make use of any except the most perfect airports, we might look forward hopefully to increases of wing loading, to 15 lbs per square ft or more in commercial types, in the interest of still higher maximum speed at reasonable rates.

Undoubtedly it is equally beyond question that, other things being equal, the airplane which loads most slowly is the safest. Since it was for the specific purpose of developing the design factors conducive to safety that the Guggenheim competition was formulated, low speed takes an important place. In case of trouble the lightly loaded plane can get down when one with twice the wing loading would have no chance of escaping injury. In the event of a mid-crash, as when the majority of planes fall on the ground, it has a much better chance of saving the passengers from serious consequences. Where shall the designer now?

There is no single solution. For transport airplanes, and especially for those with multiple engines, or those likely to be used over good flying country, unit loadings may be expected to increase steadily. Improvement in power-plants and in runway surfaces, and the general tendency to increase the size of airports, will make this feasible without any regard to what advances may be made in airplane design itself. For the use of many private owners, however, too much progress has already been made in that direction. We cannot directly balance safety against economy, for safety is the first element, but we can consider for each type how far we are justified in going in the search for economy and speed before conditions of undue danger are reached. There should be no standard trend in wing loading, or rather, there should be a trend in both directions. Clearly the addition of appropriate wing loading for specific functions should receive more attention than it frequently does at present, and the spread between the lightest and the heaviest loadings used should be further increased.



### Cultivating Airplane Sales Soil

**S**OME AIRCRAFT BUILDERS in the light and medium airplane market have recently expressed what was titled, "unexpected sales resistance." Within a country whose population exceeds 120 million people it seems incredible that the market for any type of aircraft should so quickly saturated after the recent displays of widespread interest. The answer is that while there is an stimulated public, there is not as yet an airplane-buying public, at least not in the sense that there is an automobile-buying public. It is possible to sell an automobile to almost any human being.

regardless of age, sex, or condition, who can find the purchase price. In selling an airplane it is first necessary to teach a man to fly and then to find something for him to do with the plane after he gets it.

When we consider the sales possibilities of pilots or those who are training to become pilots we have about saturated that important airplane market and it becomes necessary to go west and south and people to fly. These sales to large corporations are made through pilots and the factory which does not have a following of pilots must either build one or be forced out of the business of building and selling airplanes.

Nothing is more vital to the program of aviation at this time than the extension of flying schools by small flight studios.



### More and Better Navigation

**T**HROUGH THE AVERAGE pilot, navigation still means following a straight line. He may go the length of using a compass corrected for deviation and taking at least an approximate correction for drift. Beyond that point, unless he be one of a very select and experienced group, he respectfully submits the navigator's art as one of the Seven Deadly Mysteries.

For going from Fort Worth to Wichita, or from Atlanta to Richmond, the prevailing practice is direct. Over some of the less thickly settled regions of the United States they do less well. Over populous areas, or rapidly populated districts of jungle, they do not do at all as a regular reliance—notwithstanding the success of Lindbergh and a few others in hitting their marks after long voyages with only dead-reckoning and a compass for their guides. Those who have been successful by such methods are the first to know that some element of good luck went with it if the goal is to be hit exactly.

For most purposes "deadreckoning" or dead reckoning, reasonably backed by radio, constitutes the sole reliance. If planes are to cross the oceans, and particularly if they are to make use of artificial islands as mid-ocean bases, long spells in an infinite waste of water, they must have more. Whatever use may be made of radio, the navigator of on-going airplanes must, like the navigators of surface craft, be able to determine their position by their own resources. The sun or stars must give them all they need.

Cold front navigation for aircraft is in a curious and anomalous position. The theory has been exhaustively studied. Byrd, Davis, De Agostin, Werner Hagenberger and others have had should have labored to devise better instruments and simpler and quicker tables for the special needs of the aerial transfer. Admiral Caudillo da Sabat, Hagenberger, and Carter, among others, have given repeated proof of the possibility of finding one's way directly from point to point without ever using the

ground and with no radio beacon installed. To the great body of their fellow-pilots the subject remains a closed book.

Many of them will no doubt get through their active flying careers without ever needing to use a compass, but none of them ought to get far without knowing what it is. The instrument contains no unfathomable secret. It is used successfully every day by fishing skippers whose nautical education stopped almost before it had begun. No airplane pilot need concern himself unable to master its workings.

An explanation of celestial navigation, and especially of its limitations, ought to be a part of every transport course. A large plane will have a professional navigator, but the pilot must know how exact his instruments are likely to be, and how close a course the observations of heavenly bodies should enable him to steer. He should be taught those things as a matter of course. Equally important, the Navy, to which aerial navigation is a life-and-death matter, should continue its researches and refinements and make them public. Data on the sources of error are still inadequate. The Navy, which publishes the *Nautical Almanac* and most of the best navigation tables, should supply them.



### Wall Street's Crash

**T**HE great stock-market collapse of October 24 has attracted as much attention in the aeronautical industry as elsewhere. It has spelled apprehension for many individuals, and still greater for some. It has been accompanied by the usual flurry of amateur prophecies that the end of the world is at hand.

This is a time for soberness. The visible basis of Thursday a week ago removed a number of ex-holders of paper profits from among the potential purchasers of airplanes, and to that extent it will require substantially upon next year's sales, but upon the ultimate stability of the stronger part of the airplane industry it will have no effect whatever. It might be a serious matter if new capital were urgently needed, but fortunately the industry attracted a valuable glut of capital during the past spring. The financial position of most if not all of the larger producers insures their ability to weather any storms of the present stock-market cycle without new appeals for funds.

No airplanes are built at the corner of Wall and Broad Streets. The progress of aviation does not depend upon speculative profits. We shall do ourselves a very bad turn if we permit the exaltation of the speculative market to create the impression that the would-be maker of a "quick turn" is the dominant figure in our industry. The future lies with those who stay with the building and marketing of airplanes through fair weather and foul, indifferent to the hourly fluctuations of the ticker

# THE *Tour* ARRIVES AT

*John Livingston, Flying Whirlwind-Waco, Wins First Place With*

BY JOHN T. NEVILL  
*Student Editor of AVIATION*

**F**LIVING LOW beneath a 700 ft. ceiling and in the face of exceedingly poor visibility, enough fuel and men that were never less than a remarkable record during the fast 100 miles of a 5,017-mile flight, via 1939 National Air Tour—25 competing planes and 10 or more accompanying craft—headed safely on Reed Airport, Monroeville, October 21.

It was a difficult lap, that last leg, the most trying of the entire *Tour*, but all of the 25 entries still left in competition in Kalispell, the final non-stop stopping point, got through except one. Capt. William Lancaster, English pilot, flying an American Cessna-governed Great Lakes monoplane, suffered engine trouble shortly after his take-off from Kalispell and damaged his plane in landing. Through tremendous sacrifice of the competing planes, Capt. Lancaster will be officially reprimanded as a finishing pilot, and will receive a check for \$300 awarded to him as such. The *Tour*, however, actually continued to an starting point with 24 of the 29 starting craft, five of the entries having withdrawn either because of motor

trouble or plane damage. Within an hour after the last plane had landed the storm was settled as tightly over lower Michigan that the *Tour* pilots were storm-bound in Detroit for several days.

As could be safely forecast at the event's beginning on October 5, accident or engine motor trouble exacted the 1939 National Air Tour, and the Edsel B. Ford reliability trophy plus the \$2,500 cash prize that goes with it went to John Livingston, pilot of a Waco straight-wing biplane, powered by a 345 hp. Wright engine. Livingston's "speed" of 140.7 mph. was marked with the fact that he flew only one of the *Tour*'s 22 legs within his scheduled time, making it impossible for any competitor to beat him. Throughout the 5,000 miles Livingston maintained a speed of 115.12 mph., or better. His constant load 922 lbs., the Department of Commerce allowable useful load, for the Waco "225," although under the rules he was required to carry only 75 per cent of that load.

With no room to distract from the essential ability of Mr. Livingston to navigate his ship over the prescribed course, many parts of which forbade any deviation from a straight air-line route, the high "figure of merit" which enabled the Waco pilot to walk away with victory was, no doubt, the result of the ability of his ship

Competing planes at the Reed Airport at the start of the 1939 National Air Tour



# DETROIT

*a Grand Total of 45,672.64 Points*

when backed by his own piloting skill, to lead and take off within an exceptionally brief space of time. In the pre-*Tour* tests made at Ford Airport Livingston set a "start" record of 3.4 seconds, and an "arrival" record of 4.4 seconds.

Livingston's triumph brought to the Waco Aircraft Company, at Troy, Ohio, for the second consecutive year, the Edsel B. Ford trophy, the 1938 *Tour* having been won by the late Major John P. Wood, of Winona, Wis., with a Waco 10, also equipped with a Wright engine. The trophy goes permanently to the company winning it three consecutive years.

A Waco "225" also placed second place in this year's *Tour*, Arthur J. Davis, of Lansing, Mich., seconded with his own biplane, and winning \$1,000. Davis held the next to highest "figure of merit" and flew the route with only one "superior score." Third place was won by a tri-motorized Ford, powered by a Wright and two Wright 300's, fourth by a Curtiss Condor, equipped with two geared Compressors.

The ten cash prize winners in order, plane, power plant, pilot, total score, and amount of prize follows:

Plane, Wright, etc., 2000 Lbs. Load	HP	Score	Prize
Waco, Wright 300, Art Davis	345	410	\$1,000
Waco, Wright 300, J. D. Davis	345	410	\$1,000
Curtiss Condor, J. Davis	345	410	\$1,000
Waco, Wright 300, George W. Johnson	345	374.50	\$1,000
Reed, Wright 300, Robert Wood	345	374.50	\$1,000
Condor, Curtiss Condor, J. Davis	345	374.50	\$1,000
Phantom 25, Wright 300, William Walker	345	374.50	\$1,000
Phantom 25, Wright 300, William Walker	345	374.50	\$1,000
Phantom 25, Wright 300, William Walker	345	374.50	\$1,000

**O**UTRAGEOUSLY, in third order of standing, were: Stanley Gossman, 225 Wright Cessna, Dale Jackson, 225 Wright Cessna, Thorne, 225 Wright Cessna, Steve Layer, 350 Wright Cessna, Richard W. Paus, Wang Fairchild 21, Charles W. Meyers, American Cessna Great Lakes Trainer, Wiley Post, Wasp Lockheed, J. L. McGrady, 225 Wright Cessna Thrash, Russell Young, 300 Wright, Ryan, Al Eessak, Gypsy Moth, Rudolf Wagner, Hornet Boeing 95, W. Conroy Shulkin, Curtiss Challenger Robin, Miss May Harpold, Wreath American Eagle, and Newman Walkow, 300 Wright Thrash Air.

Mrs. Miller, winner of eighth place, is the first woman to place "in the money" in any National Air Tour since the institution was started in 1925. The *Tour*, this year, featured three women contestants, Mrs. Miller, Miss Hailstone, and Miss Ernestine Harrel, whose plane, a Gypsy Moth, was built in Cincinnati. The girl pilot was not in any way at fault in the mishap, which resulted from another plane cutting in on her as she was about to land.

Livingston was presented with the Edsel B. Ford trophy following a banquet in one of the Ford buildings at



The *Tour* places at the Alberta Airport, Alberta, Can., photographed from the air.

shortly after the event's stormy finish. The presentation was made by William B. Stodd for Edsel B. Ford. The cash awards were handed out the following day at a luncheon reception by William Mayo, chief engineer of the Ford Company.

At the luncheon it was announced by Captain Roy Collins, manager of the *Tour*, that checks for \$200, the second going to any flier, would also go to the five pilots who started and failed to finish. These contestants were Mrs. Miller, who wrecked her Wallace Tompkins in Bismarck; Miss Harrel, who wrecked her Math at Cincinnati; D. Morgan Hailstone, who washed out his Panhandle KR between Springfield, Mo., and Wichita; Captain Laramore, whose Great Lakes Trainer came to grief during the very hot leg of the long route, and Forrest O'Brien, withdrawn by his company because of engine trouble. Dale Jackson, of evasive flight fame, was awarded a special \$300 prize for his *Tour* performance by the Sunstrand Flying Co., of Bridgeport, to be awarded at the *Tour* manager's discretion.

Captain Collins asked the contestants for suggestions as to disposition of the money, and a woman pilot suggested that it should go to women for having flown away leg within schedule time, and still not having "paid the money." Jackson and Livingston, incidentally, were the only two contestants with such a record, although there were a number of others nearby. Hailstone, Davis, Zeller, Shulkin and Post, who made only one imperfect score. Four others, Gossman, Wagner, Werner, and Paus, were also into control points only once.

Charles W. Meyers, chief test pilot for the Great Lakes Aircraft Corporation, Cleveland, O., explained during the meeting the terms under which planes entered in the 1939 *Tour* will compete for the Great Lakes Lig

Plane trophy next year. The trophy, Mr. Mowers said, will go to the craft equipped with an engine of 310 cu in. displacement or less aggregating the highest number of points under the same formula employed by the National Air Team. Like the Edsel B. Ford trophy, the Great Lakes trophy will become the permanent property of the manufacturer winning it for three successive years.

Major Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, Mr. May, and Luke Christopher, chairman of the Course Committee, N.A.A., who were present at the luncheon, congratulated the pilots and their officials on the splendid manner the event was run. A brief history of the development of the course and of the luncheon was held, but this will be incorporated in a later article. Major Young commented that a meeting between commercial airplane manufacturers and operators of the Teal would be called sometime within the next 30 days to discuss plans for the 1930 classic.

ALTHOUGH nearly 1,200 miles shorter, the 1929 Air Show seemed somewhat more difficult to fly on schedule than last year's event, or, doubtless, due to the more condensed flying schedule, more numerous laps with headwinds, and the 5 per cent higher average speed required. This year the Tour pilots traversed a lot of country where skillful and accurate navigation by compass was essential, but it did not seem to the writer that the mileage over such country exceeded that of last year.

There were eight of the contestants who always took turns at averaging the five fastest speeds on every leg, this group consisting of Wiley Post, Steve Lacy, Stanley Stansbie, George Haldeman, Robert Nigle, John Livingston, Arthur Davis, and Stephen Wagner, with Lockheed, a Bucking, two Cesars, one Bellanca, and one Waco. In most cases the Lockheed was the first, with Lacy's Cesars second. Post averaged between 350 and 360 m.p.h. and was followed with occasional bursts of 180 to 180 when favored by the wind. It is noteworthy that the two fastest trips in the T-6s, the Lockheed flown by Post and the Cesars piloted by Lacy, were not among the ten prime winners.

The quiet efficiency and reliability maintained throughout the tour by the accompanying ships is also quite worthy of mention. These were about one of these fast entirely around the route, and several others, though not quite so fast, were along the route, and were equally worthy of mention were the *Fireside*, built by L. W. Bryant, the *Wright Ford* piloted by George Chapman, the *Standard Oil "Weather Ship"* flown by Rodney Lanceot, the *Georodich Lockheed* and the *Texas Lockheed* flown by Lee Schaeffer and Capt. Frank M. Hawks, respectively, the *Douglas O-2*, piloted by Leslie Wendell Brodeley, the *Columbia "Trad" amphibian*, flown by Bruce G. Williams, the *Mobile Lockheed*, piloted by Capt. Charles P. Powers, the *Tow Tow* piloted by W. E. (Pop) Cheever, the *Berlin Kress Lockheed*, flown by Frank Cheever, and last but not least the *Pearl and Whitney Voight Corsair*, piloted by the astute Bernard L. Whalen.

In number Wright engined all other power plants among the 29 competing craft, with a total of 16. Pratt and Whitney contributed seven, Curtiss Aeroplane and Motor four, Kinner two, American Canso two, Goodyear two, and Warner one. Propeller equipment consisted of 15 Standard Steel, 12 Hamilton, 4 Canso Root, 2 Methyl Special, and 1 Husted. Twenty-eight of the competing craft were equipped with Pouyer and one with Canadian

and instruments, several of the ships carrying some of each. There were 24 sets of Bevels' wheel and linkas, two ships with breakers of their own, reader, and three ships without breakers. Goochitch headed the tire line, with his equipment on 17 ships. Goochitch tires were found on nine ships, United States tires on two, and Dorop on one. Being standard equipment on practically all of

The Tour's air-cooled engines, Sunbeam magneto and twin with headers in that field. The only two engines competing in the Tour, in fact, equipped with other ignition units were the two DE Gyro's, both of which used the English BTHR magneto. Among the spark plug manufacturers was 30 sets at HG, one of Chappells, and two English KLG. Stromberg carburetors played a prominent part in the Tour, for the same reason as did Knickebein engines and BGM plug. Other accessories noted in a large percentage of entries included Axle shock traps, Edson starters, Berry Bros finish, and Hammett's rods.

Steve's detailed report of the first 4½ legs of the Tour, from Tattnall to Jacksonville, Fla., has been published in an earlier issue of *AVIATION*; this article will be followed up by a day-long stay at Jacksonville and carry on through the finish.

With 28 or 29 planes still in the running, the National Air Tour began its second week of flying at Jacksonville, Fla., on Saturday, Oct. 12, a 200-mile hop to Macon, Ga., being made in the morning and a short 2-mile flight to Atlanta, Ga., in the afternoon.

Completion of these two legs meant that the Tour had covered a distance of 2,263 miles, or, a little less than half of the 5,017 miles included in the Tour route. San Francisco was named a two-day stop, the only two-day stop of the Tour, and the pilots spent the week-end, October 26-27, 1934, in the city.

During November, three planes were shot down, and one was destroyed, especially as far as the 210th was concerned, especially between Augusta and Jacksonville.adequate northeast surface winds around the nose of a tail, hindered most when they helped the pilots on the navigation leg. The best flying level, Mr. Andrus, the navigation pilot, reported, was to be found at 8,000 ft., but during twenty eves inhaled the sky became overcast with a ceiling of 2,000 ft., just as the pilots preferred flying under the ceiling and putting up with the less favorable winds. The overcast sky, however, continued only for about 60 miles inland, then it broke rapidly and disappeared continued two Macau. Numerous weather reports from the Tavod Air Force base at Hanoi, a March 10, 1968, and stated: "A. Rivas, was the only one who had been flying for a fortnight on schedule time and were late Macau. The Warren-powered Cessna, formerly owned by Earl Bowland, had moved over upon landing at Jacksonville and was kept waiting Saturday morning on the Jacksonville field for a new propeller. When Rivas and became ill in Rivas' home town the Cessna repair was flown to be in as Auguste by Joseph Merhys, a reserve pilot. When the accident happened, however, it was being piloted by Henry Poirier. Merhys was again at the controls

Wiley Post, pilot of the Tissue's only Lockheed entry Waspsinger entry, averaged the highest speed of any of the contestants over the Jacksonville-Macon course, with times for the 200 miles being 1 hr 18 min 40 sec. Steve Lacy in his Wright 16-300 Conna flew it an hour 21 min and 43 sec. The three next best times were set by George Haldeman (Bellanca), 1 hr 25 min 20 sec.



THE TEST 電影評論 2013年1月號 第16期

see: Bob Niggle (Bellarmine), 1 hr. 20 min. 52 sec., and John Lyman (Waco), 1 hr. 22 min. 12 sec.

With an elapsed time of 36 mins 39 sec, Lacey headed the time trials by Post as the afternoon began—the 22-mile flight to Atlanta. Post's time for that flight was 38 mins 26 sec. Livingston was third, with 32 mins 27 sec. Art Davis (Waco), fourth, with 33 mins 33 sec, and Hildebrand, fifth, with 34 mins 36 sec. The afternoon flight was made beneath virtually clear skies, with light surface winds blowing south-south east. The flying time for the loop was low, and most of the pilots remained well under

The "Preston" Ford piloted by L. W. Bryant and used as the Team's official press ship again went "sight-seeing," mapping its course over Athens, Ga., in order to get a press at the Georgia-Yale football game from the air. Between Athens and Atlanta, the press ship circled around Stone Mountain in order to give the occupants of the cabin a look at the much-disputed Southern monument.

One accident was chalked up in Atlanta. Roger O. Wilhens, who had been accompanying the Tex in a single-engined Cessna 170B amphibian, damaged his water gear while landing on Candler Field. The tail of the Texan was taken off and had to be repaired. Wilhens again joined the Tex at St. Louis. Dee Maffet, pilot of the Wallace Touroplane equipped in Baltimore, rejoined the tour in Atlanta with a new Touroplane, although not as a concession.

After having rested over the weekend the Tour began on Monday morning the first of two legs that ended in Cincinnati that night. The day's itinerary, 391 miles to Murfreesboro, Tenn., and 246 miles to Cincinnati, seemed to mark the end of the shorter hop days, and the beginning of comparatively long journeys. Furthermore, in traversing the Tennessee, Ohio, Illinois and Cincinnati areas, the route was mostly over the roads of the Appalachians range, necessitating a climb on nearly high altitudes in order to maintain a faster rate of safety in event of major trouble. Both hops were made under shadowy skies with increasing headwinds ranging from north to northeast on the upper levels.

The "Pittsburgh" passenger ship never flew the Atlanta-Murfreesboro revenue stream, but deviated somewhat in order to pass over Chattanooga. It was observed that this ship had to attain 5,000 ft. in order to clear some of the heaviest mountain masses.

When all of the planes had settled upon "Tennessee Sky Harbor" at Meridianville it was found that seven of them had exceeded their allotted elapsed time in flying the 150 miles thus suffering imperfect scores being Single Motor Wulff, Meyers Kraut, Max Hataly,

Miss Harrel, "Tennessee Sky Harbor," incidentally, now about 30 miles from Nashville, as operated Interstate Airlines, Inc., and was being deducted the day of the Tour's stop. Post's Lockheed covered the flying leg in 1 hr 19 min 43 sec, the best time of any of the contestants. State Laney's Cessna was second best, 1 hr 23 min 27 sec. Stanley Stinson (bird, 4 sec., 96 min, 50 sec, Lexington, fourth) 1 hr 34 min 09 sec.

and Baldwin, 615, 1 in 35 sec 04 sec  
Headwinds over the 246-mile stretch into Cincinnati  
were responsible for the superior scores but that big  
gusts by Meyers, Lancaster, Wadow and Meyers  
over this course the pilots were pointing their craft about  
2 degrees east of due north, at a time when the winds  
had shifted from south to northeast. More than half of  
the time, too, was of such treacherous nature that  
a flier was out of the question.

The TEA last has an essay story in *Cloudland*, this time one of the three women plots, all of whom, incidentally, had been giving a good account of themselves throughout the interregnum. According to the story told by Miss Smith, the sorcerous one, she flew over the Swiss mountains as London Airport engineer in, then circled the Alps, shortcircuited her engine and phoned in to land. When only a few feet off the ground, she said another plane, this one of the TEA's group, landing downstream got in the way. Opening her throttle she took off again, instead, flying around and away in again, instead, she stalled, flying only about 30 ft. from trees, "Toys" Cloudland, the legend of a group of flyers who were stalling, flying around and over. The little Gipsy Moth was a good possibility of repair in time to catch the TEA. Miss Smith escaped with a loosened nose and a badly bruised right eye. She continued the TEA as a passenger in the service Cessna. The accident left 17 of the 28 starters, 11 contestants for the British Field medals.

Despite the distance of the Marquette-Cincinnati, the headwind, and the navigating difficulties that are encountered in mountain travel, some splendid times were turned in. Wiley Post, negotiating the distance in 1 hr. 36 min. 19 sec.; Steve Lacy, in 1 hr. 36 sec.; Stanley Stratton, in 1 hr. 35 min. 18 sec.; Bob Steele in 1 hr. 38 min. 39 sec., and Lehman

An interesting story is told about That's second time to  
the mountains. As was the custom, Lee Schenckhart, carrying  
Tom Schlesier and E. P. Crocker, scatters in his Lodge  
and usually took off about an hour before the competition  
in order to arrive at a control point in plenty of

...as well as time to review it; a memo plus a party of five to permit the visitors to help time the contestants in. *Stan Martyniuk*, however, *Schaeffer and Hawks*



chests caught afire and were burned badly before the fire was checked at the axel. The road, incidentally, seemed to be about all that saved the Air Tour planes from total destruction.

**W**HEN THE SCORERS were checked in St. Paul, it was found that only two of the entries, the Mohr flown by Kriegel, and the Curtis Cooper, were still in the general point. The Cooper had had to land near Parkersburg, W. Va., with engine difficulties. At 5 p.m. the Tour's largest craft landed in St. Paul, where it was due to stop for the remaining miles of the route, most of its passengers. Carrying only the two pilots, R. W. Crosswell and Karl E. Voelker, and two passengers, Adam Long, and Miss Frances Harrell (the rest of the cockpit load being made up with sand) the Condor took off with the celli the following day.

Weather conditions on the day of the departure from St. Paul over the Tour the worst blow from a rainfall standpoint, the event has even been known to suffice. The planes left St. Paul with broken moderately high clouds overhead, but just east of the city the ceiling rapidly decreased, becoming low enough over the "bump" at Chippewa Lake to "lose it" on high points of the terrain. Apparently a dozen of the craft divided evenly between the competing and the non-competing planes, encountered the low clouds but at unfavorable times and failed to get through, although only a few miles apart. The remaining planes, however, did not encounter the clouds and continued on their course. About 80 miles west of Wausau, 171 miles from St. Paul, the scheduled lunch stop, broke in the overcast, appearing, enlarging considerably toward Wausau.

So many of the touring planes were "out down" in a certain cow pasture near Chippewa Falls, that Chippewa Falls should be on the records as one of the official Air Tour stops. Among those who ingloriously left this charming Wisconsin city an unscrupulous wist were Sted John Livingston, Art Davis, Al Kriegel, Bebe Young, Bill Wollens, Frank Hawke, and Ephraim W. Christ and Others, including Steve Lacy, Stanley Stanton, Nicholson, and Howard Atler, putting a non-competing plane demonstration, went down before the fog at other points where the route.

Breath of tail-winds was of those who "sat down" were exhibited on their journey and arrive in Wausau, after a scheduled flight. Here, Coonell, Lancaster, Kriegel, Wollens, McGahey, and Lacy were late into the house of last year's Tour winner. The 100-mile trip from Wausau to Milwaukee, the night stop, was made under a ceiling of 5,000 ft., with sight side winds from the west-southwest. Only two of the contestants, Wollens and McGahey, received perfect scores for the afternoon leg.

Rain and low clouds persisted in Milwaukee Saturday night and early Sunday morning, but these cleared off shortly after daybreak and the planes left Milwaukee bound for Moline, Ill., 174 miles distant, under an overcast sky. A low ceiling lifted gradually toward the west, and when Moline was reached the sky was clear of all clouds under 20,000 ft. A light headwind from the west-southwest, increasing with altitude, was the probable cause of five contestants, Lancaster, Wollens, Young, Shatto, and Miller, to rate Moline. At 4 p.m. the Tour planes about land and begin the last overnight stop of the long Tour route. Two of the pilots, Rogers and Lacy, were late arriving to the "Windy City," the latter

being forced down en route with a blown cylinder. Shortly after his unscratched landing Lacy took off again and flew into Chicago on eight cylinders. He arrived on the Curtiss-Rogers field just too late to stop the Wright service plane, piloted by Mr. Chapman, from going back to ground. The Wright plane, incidentally, became stuck in the mud when Lacy had landed and was unable to move until overcast.

Although this and the writer's preceding Air Tour article have dealt only with the success of the Tour, and have made no attempt to describe any of the 32 airports the planes landed upon, it seems that special mention should be made of the Curtis company's Gleview field in Chicago. Without taking any consideration as distance from the loop district, this airport was, in the writer's mind, the finest visited by the 1939 Tour. The municipal airport at Waukegan came in as a close second.

**O**N Monday, the final day of the Tour, the impossible flying conditions that had threatened the pilots were still, though not to Curtis Rapids, appeared but a few hours off. A forenoon top of 142 miles to Kalamazoo and the final one of 125 miles into Ford Airport were all that remained of the 8,000-mile trek. Broken clouds at about 3,000 ft. over Gleview became overcast in about 2,000 ft. over the southern edge of Lake Michigan, the clouds continuing toward Kalamazoo. About 30 miles west of Kalamazoo the ceiling declined and it had increased. The start of the competing planes from Chicago was advanced, delayed for about an hour until it was measured that the conditions was not becoming worse.

The "margins" between Chicago and Kalamazoo was measured around Lake Michigan, although the planes were in liberty to fly directly across the lake if they chose to do so. If any of the contestants did take the short cut, the writer never learned about it. Five of the contestants were late into Kalamazoo, these being Mrs. Miller, Miss Murphy, Wollens, McGahey and Meyers.

A 700-ft. ceiling, considerable rain and a requested visibility at Detroit, and even worse conditions midway, required caution in piloting the planes for the final hop. A check on conditions only 30 miles west of Detroit, that east and advance planes had passed through, indicated that a start of 8 p.m. (one hour later than the usual starting time) would give the best chance to organize the trip. Kriegel, however, was the only one of the highly efficient weather experts, notified the planes that conditions appeared to be slowly getting worse. He warned them of some low ceiling and increasing haze, but stated there would be no violent storm. The only wind was from the north and a was of moderate velocity.

"Arrival" advice were verified to the letter, but with the exception of Captain Lancaster, mentioned in the first paragraph of this article, all of the competing and accompanying pilots brought their charges through to Ford Airport. With President Hoover, Thomas A. Edison, and a host of notables either on or near the airport, the last leg, as seemed to the writer, was a magnificient and convincing argument in favor of the reliability of aircraft. Five of the pilots, however, Merton, McGahey, Kriegel, Young and Wollens, were charged with imperfect scores on the final leg.

Shortly after the last Tour plane had landed at the Detroit airport, the rain had been increased and the ceiling became dangerously low, heralding the advance northward of a tropical storm centered over Alabama and Tennessee.

# THE ROAD BUILDERS CONSIDER

## Municipal Airports

By CHARLES H. GALE  
*Assistant Editor of AVIATION*

**T**HE REALIZATIONS that there is as much if not more room, of importance, in the ground department of flying as there is in the more spectacular department of flight itself, has been increasing rapidly in recent years. By far the most vital item of this important ground department is the airport. It has been and probably always will be the greatest single factor in the progress of expanded flying, such as is represented by regular air transport. It is in it that represents the greatest single factor in the entire of proper ground equipment.

Speaking briefly, then, there cannot be too much attention to airport matters or too many meetings of those interested in that institution and efforts to pool their experience, knowledge and enthusiasm. There have been many airport conferences in recent years, but they are needed at this stage of the game. They are, however, particularly needed as they serve to draw together the various groups of persons upon airport matters. And when such group cooperation experts in matters closely allied to the complex problems of airports, the event is especially noteworthy.

Just this has happened at the Municipal Airport Conference held Oct. 26-27 at the Willard Hotel, Washington, D. C., under the aunctions of the City Officials Division of the American Road Builders' Association and sponsored by the Aerostatic Chamber of Commerce. As those dealing with airports today know full well the two most absorbing questions involved are those of drainage and surfacing. This conference brought together men who have been living drainage and surfacing for years and who have been the leaders in their field in relation to highway building, as well as much as airport know-how right now about airport ground preparation.

After listening to the discussions in two days of technical sessions dealing with major airport problems, one could not help but feel in a very sympathetic mood toward those responsible for promoting the conference. Its purpose was to inform the highway experts of our American critics of the various sources of the airport game and to stimulate them to share their interests and experiences in their local airport projects. Those who have been in airport construction work have been used to borrowing the road builder's tools, since they are the machines used for the work, and now it is proposed to apply the road builder's tools.

While most of the papers were given by men long associated with the aeronautical industry, two of the

most valuable were delivered by men primarily interested in highway construction. Their contributions served to indicate the great service their professions may perform in the country's airport development program. Reference is made to the paper on drainage and the paper on surfacing, to be described later in this article. About 250 attended the conference and about 200 of these were highway experts, men representing practically the entire country. The balance were for the most part airport construction men, airport managers, and others devoting their entire time to the aeronautical industry.

Summarizing the general impression one derived, it was apparent that there is an even more marked trend toward surfaced runways, principally for take-off purposes, than was experienced at even to recent a conference as the meeting at Cleveland last May, though a definite trend toward un-surfaced airport building construction and planning was evident. The most important point of this was a frank realization of the shortcomings still existing. Naturally the emphasis at this conference was on municipal airports, since it was held for the benefit of city officials, but commercial ports could benefit because of the similarity of problems.

"The airport development program in this country has been terrible," declared Hon. David S. Ingalls, assistant secretary of the Navy for aeronautics, as the course of the main address of the luncheon session preceding the first technical session, which started at 1 p.m. Thursday afternoon. "Airports constitute the most essential department in aviation at the present time, he went on to say, and he bemoaned the situation which the American Road Builders' Association was giving in the problem through the medium of the conference.

**C**apt. H. H. Bush, chief of the Airports and Information Section of the Aerostatic Branch, provided all three of the technical sessions. In introducing R. Russell Shaw, St. Louis airport engineer and first speaker at the opening technical session, he called attention to the fact that about 1,200 communities are making plans in various stages of maturity to construct airports while about 1,100 are in the process of constructing landing facilities. This states that the unconstructed airport in this country has passed, he said, and only expert treatment of the airport will suffice.

Mr. Shaw took advantage of the fact that the conference comprised many city officials to remind those gathered in the room how airport projects have tended to be

rather shabbily treated, merely as political footballs. He discussed "Airport Planning" according to the ten aspects of it: the selection, layout, clearing and grading, drainage, surfacing, lighting, site protection, housing, public accommodations, and possible revenue to derive therefrom. While a number of well-qualified problems of road building would naturally fall into this category, the most of services covered by these topics, nevertheless, the conference was revisited, that the situation is not as simple as it looks on the surface and that a wide variety of circumstances pertain to aviation enter into each of these departments of an airport project.

For instance, in airport planning it is important to determine the facilities of the proposed airport—whether it is to be primarily military or commercial and, if the latter, whether it is to be harbor airports, schools, manufacturing, general commercial operations, or special activities. These factors influence the nature and arrangement of the buildings on the airport as well as the size and type of terrain to be chosen on which to locate the port. Light traffic planes, as an example, require a much less obviously prepared surface than would the heavier transport types.

Definition of the kind of most areas for city landing fields is not recommended specifically by the speaker. Masters of various and varying air carriers bound to be set up around such a structure, the board of public works and engineering sites would be consulted in his talk of such in this type of airport. As far as he is, it was stated that a building providing a roof with 3,000 ft. runways in all direction would be of proportionate dimension.

In the discussion which followed, emphasis again was given to the desirability of avoiding airport projects within the general city plan and the fact that in all airport projects the ultimate evolution of the economic aspect should not be forgotten. That is, measure roadways is vital and may be assured only by study of revenue sources and volume of use by public and private carriers.

Plans for better airport buildings, both structurally and substantially, and for the adoption of such as part of a general plan of design and arrangement were the basis of the paper by Kenneth Frazer, architect of the Curtis Airports Corporation. He stated further the cashflow by declaring that there are today almost no airport buildings in this country which will be standing five years from now. "With rapidly increasing we have no really permanent structures," he disclosed. A more encouraging outlook was presented, however, by a later statement, that many buildings now under construction represent a considerable advance over those six months ago in regard to permanence, design and construction.

It still is impossible, he said, to secure approval of a design of a building that is even fully comparable to buildings which have been constructed and are now under construction at European airports. Much of the opposition in due to owners who fear tenants will not pay sufficient rental to justify the best sort of buildings. But here again a trend is noted toward appreciation by owners and tenants of the value of improved structures.

Strong emphasis was taken by Mr. Frazer's statements, in the discussion following the reading of the paper, by Maj. John Berry, of the Cleveland Airport. He declared that permanency of construction should characterize many Mid-West and Western airport buildings, the Cleveland Airport being a good in point.

In reply it was pointed out by other commentators, as well as Mr. Frazer, that the speaker sought a definite general architectural scheme for the airport development in addition to a permanent type of construction. Another trend is toward the permanent separation of buildings on airports for carrying out of work and the grouping of buildings having allied activities. Mr. Frazer added that the use of the landing or wing for overhead and repair work is losing favor at the larger airports and a separate building devoted entirely to this sort of work is replacing it. Included in this tendency is the major hangar building, which replaces the old engine test blocks, and the design and paint shop.

A request for information regarding methods of leasing hangars at municipal airports brought out the fact that Buffalo's hangars are owned by the city and leased on the basis of 10 per cent of the hangar cost. In the case of the small hangars whose space is leased to individuals, the city looks after the operations of the hangar. In the case of the larger hangars, they are rented to the larger operators who are charged with the administration of the hangar, the lease, lighting, heating and water from the city. Maintenance cost of airport roads and buildings, etc., is apportioned among the tenants.

At Cleveland the city has built only the administration building. All the others have been erected on ground leased in units of 250 sq. ft. at the rate of \$3,000 per unit. Hangars must have a rent of not less than \$100 ft. The Akron officials are opposed to city built or operated buildings other than an administration building and a service hotel. Hangars may be erected on ground leased for 25 years at the rate of not less than \$3.50 per square foot.

Moderate architecture is stipulated and half brick must be used.

The maximum span of the hangars is Zone A (the principal operating area at Akron) has been set at 300 ft.

These same officials reached more flexible ground when a group devoted entirely to airport drainage was read by A. H. Hogenauer, senior highway engineer of the Bureau of Public Roads. This was easily the most technical and most interesting of the subjects treated in the first afternoon session. Highway engineers have been facing drainage problems for years and it was evident that one of their most valuable contributions to airports lie in this field.

While a great deal is known about drainage, even Mr. Hogenauer, in conjunction with other experts present, reluctantly admitted that "pavil" is the correct definition of any number of aspects of the drainage engineer. This matter of drainage by the way, falls into two categories: natural drainage and artificial drainage.

Every effort should be made, of course, to select a site which by virtue of a naturally porous soil and the presence of a slight slope, would not require the installation of an artificial system. The desirable airport sites were often then not of such a nature that the soil demands some artificial arrangement to keep them in shape for constant use. In this case the first thing to do is to make a thorough examination of the site to determine the ground water elevation, and the arrangement and permeability of the zones comprising the water profile. A thorough knowledge of performance of water on sand in the soil is essential.

Artificial drainage may be required to remove surface water, intercept seepage, or, depending on the local climate, reduce the chance of freezing due to frost. To



Left: C. W. Conner, President of the Road Builders' Association, whose paper, based on his own building experience, outlined methods of construction of airports. Right: Kenneth Frazer, architect of the Curtis Airports Corporation, whose paper discussed methods of drainage in airport buildings.

make use of surface water, drains should be placed along the edge of runways (where runways have been installed), at intervals determined by local soil and water conditions over the entire landing area (where runways are absent). Drains to intercept seepage should be placed along the edge of runways and, in some extreme cases under the runways. Where no runways are used the spacing of surface drains represents another of the problems involved in drainage engineering, each individual airport site requiring special treatment.

The main factors of drainage installation are: depth of soil to be placed under ground, use of the drain, type, and construction. As for depth, it is the general rule to place the drain low enough to intercept the seepage source. Where there is no impervious stratum, it is the rule to extend the drains to a depth of about 3 ft. in clay and 3 ft. in silt, where freezing does not occur. Otherwise the drains should extend to a depth equal to at least the depth of frost penetration.

The type of the drain, of course, on such considerations as the local rate of rainfall, size of drain to be drained, volume of surface water, rainfall, and time allowed for removal of water, according to Mr. Hogenauer. Various devices have been evolved to simplify the construction of drain systems. Type of drain is governed by the nature of the airport traffic. The drain must be able to withstand the landing loads of the aircraft which will be using the field. This involves the relative merits of metal, tile and concrete installations.

As for drain construction, it seems to be the rule, according to the speaker, to place perforated metal or concrete tiles downspouts upon a porous base, while tile or concrete drain tile is either set in a trench bottom. Engineers seem to agree that trenches containing bottom drains should have a backfill of porous material. The use of trenches to support and repair the drainage system was recommended.

The paper reminded that air in the soil must be taken into consideration at all times for water cannot enter and wind the air has escaped. An artificial drain serves

as an avenue of escape for this air so that two things may happen: the water is permitted to enter the ground and the water held in the surface is able to flow into the drain and be carried off.

From personal another of the points about which very little is in the nature of general rules may be developed in study and had even in extensive clay, when conditions do not encourage infiltration, there need be little concern about frost heaving. Permeable soils and similar and composition offer something else again and because of their tendency to develop serious frost conditions, a remedy must be applied. The speaker recommended that drains be placed longitudinally along the center of the runways, in these cases and deep enough to coincide with the maximum frost depth.

In running out very general recommendations for drainage, several types of drainage fields, Mr. Hogenauer stated that drains may be spaced up to about 300 ft. or more apart on a field consisting of dense impervious clay while the spacing would have to be much closer on the same field if it happened to be a plowed or rough surface with a low runoff factor. Another type recommended was a field having a top surface of three or four feet of alluvium by a dense, impervious clay. The distance should not be more than 30 or 33 ft. apart in this case. As for a soft peat or marsh surface, he recommended placing a layer of good material above it rather than trying to drain it.

The four speakers at the banquet Thursday night in the interests of the Whiting Hotel were Senator Thomas B. Hinckley, president of the N.A.A.; Maj. Gen. George E. Dryden, president of the Colonial Airways System; Hiram C. Sawyer, director and managing secretary of the New England, and Gen. John W. Irving, general manager of the Boston and Maine, and assistant postmaster general in charge of the air mail.

The Airplane is expected by Senator Hinckley to have considerable influence on the future airport. These airports may serve as ferry planes between downtown airports and outlying bases. He agreed that the greatest problem now are on the ground, rather than in the air, giving engineers like the road builders a great opportunity to contribute to the advancement of the industry. Senator Hinckley took occasion to voice his opposition to the idea of placing control of airlines under the Interstate Commerce Commission. He based this disbelief on the contention that the two methods of transportation, air and rail, are inapplicable, are fundamentally as incompatible as oil and water. The same could not intelligently deal with both.

General Dryden described the commercial future of aviation and Secretary Sawyer seconded Senator Hinckley's contention about the future of the Aztec type. The latter also described the recent acquisition by aviation flights of East James Dooley, Mr. Givier declared that the government is still absolutely sold on the idea of oil in spite of representations to the contrary which have been created. Shortly following the recent air mail rate hearings, he urged the removal of imports from planes and expressed extreme dissatisfaction with the present airport facilities for air mail planes in the city of Washington.

An account of the very valuable work which the road builders can contribute to the repair of worn concrete was contained in the paper read by the Frosty Sealing Assoc. on airport surfaces. This was given by C. N. Conner, engineer in charge of the Road Builders' Association. It contained a great deal of information

based, practically exclusively, of course, on his years of experience with road building problems. Yet they were applicable to the airport situation as well.

Problems of impact of aircraft upon a surface and the greatest wear and tear of vehicles that would have to be used with it. Costs, and his preference. Major consideration merit for up-to-date modernization of the airport needs delivered by landing aircraft, he said, but it is evident that the modernizers would start in on much research with a great advantage over the average investigator.

He classified airport surfaces under four divisions: Group 1—gravel and crushed earth, which includes earth and soil, group 2—low types, which includes selected soils, clay, gravel, crushed stone, slag and cinders; group 3—intermediate types, which includes bituminous pavements of various types laid on a prepared subgrade or base course; then a Portland Cement concrete base; group 4—the high types which are surfaces composed of Portland Cement or we had on a Portland Cement concrete base.

Group 1 has advantages such as low first cost, good drainage, and good for future surfaces and good wheel braking, but has the disadvantage of high maintenance cost, poor visibility from the air, poor background for markings, susceptibility to soft shale, etc. Group 2 has the advantages of low first cost, good drainage, good wheel braking and good base for future surfaces, while it has the disadvantage of high maintenance cost, poor background for markings, drainage by shale, dust, dust Group 3 includes four types: surface treatment, penetration, Macadam, asphalt in place and the prepared. These offer the advantages of fairly low initial and maintenance cost, except for the surface type which has a high maintenance cost, and the prepared type which has a high first cost. Classification of the road as a good landing surface and fairly long life, but cannot for the first, or second, type. The last three types have the disadvantage of requiring expert maintenance. Group 4 offers a low maintenance cost, good visibility, long life, classification of road and dust, and is tough and durable. Its disadvantages are need for skill in design and fairly high first cost.

His conclusions were: (1) Research is needed for determining the landing forces impressed on airport surfaces by aircraft. Present data is not conclusive.

(2) Surfaces of earth and turf are inadequate for heavy planes.

(3) Airport surfaces may be constructed by the stage and progressive method on the principle of association with a high type road.

(4) Traffic surveys and traffic lights are necessary before determining the method of procedure and type of surfaces.

(5) Construction and maintenance methods for airport surfaces are the same as for highway surfacing.

(6) In general the high types of surfacing cost the most for initial construction.

(7) The high types of surfacing cost less for maintenance than the low types and intermediate types.

(8) Strong indications are that aircraft surfaces when of the same type as highway surfaces should cost less than highway surfaces, because they may be thinner and because construction conditions are more easily controlled.

(9) Highway engineers, highway contractors and highway equipment manufacturers are the best qualified group for constructing and maintaining airport surfaces.

The question was asked in the discussion period an

to the effect of calcium chloride used for airport surfaces as the usual salts of aircraft operating thorugh it was reported that at Akron a quantity of the fluid was used in an airport parking area and that Dr. Amason of the Goodyear-Zeppelin Corporation requested that no part of this be used where aircraft would be maneuvered if it were to come in contact with aircraft. It was also indicated that extensive tests had been made by the service people in which it was shown that not only does the composition have a bad effect on light alloys, but in action is of an insulation nature, being a substance unsuited to aircraft insulation.

A. Fredleton Takademi, Jr., chief of the field service section of the Aerostatics Branch, was the second speaker of the meeting session. His discussions of airport management was confined principally to the municipal airport rather than the commercial airports, although it is true that the two have many common problems. Good management is essential, he pointed out, to safety and part efficiency. The latter applies not only to the field operations but also to the business status of the institution.

Control of all aerial traffic and ground traffic needs the most careful planning. It was also recommended that the great investment of land, buildings, planes and equipment represented in a large airport shall wait on the movement of one plane at a time, as it all too often the present situation.

In his paper on Airport Progress, St. E. Dufly, manager of the Buffalo airport, presented his ideas of what every modern airport should have. Among the services points brought out were the greatest need of such institutions as the control tower, airport hotel, attractive administration building, a garage to greet each incoming plane, parallel runways (one for landing and one for taking off), concentration of obstructions, such as hangars, terminal eating places and other buildings.

He also mentioned that Stater and Poel travel interests in Buffalo are surveying leading airports with an eye to the inauguration of an airport bus line.

Adopting fire protection was emphasized and in this connection he mentioned the Buffalo plan for a fountain parapet rigged with a derrick and chain for the best handling of a plane fire so which it is necessary to smother the burning machine for rescue or other purposes.

Discussion airport and public parks, Louis Col U. S.

Grant, manager of public buildings and parks in the District of Columbia, said that the present airport park construction is not being airport requirements widely exist in most cases. That the establishment of one new special agency for airport administration would be unnecessary, investigations, be conducted, and the placing of the airport or airport site under a park board would lessen the permanent resistance for that purpose.

The final paper of the technical session was read by Maj. Clarence M. Young, assistant secretary of commerce for aeronautics. He discussed in some detail his recent flying tour of a number of important European air centers. Particularly impressive to him were the completeness of the administrative systems and equipment in such airports as Crete, Le Bourget and Tempelhof, and the extreme care taken of the comfort of the public. The three lessons which that country might apply, he said, were: (1) Adherence to principles with a qualified executive in charge, (2) development of all activities, including the airport, when possible and feasible, and (3) uniform rules and regulations governing the operation of aircraft in the vicinity of the airport, and in landing and taking-off.

The question was asked in the discussion period an

# FACTORY COOPERATION

## Boosts DISTRIBUTOR SALES

By DOUGLAS W. CLEPHANE  
*Ryan Aircraft Corporation*

**W**HEN the period of intense competition for airplane sales just beginning, sales policies are largely in the formative stage and there are many vital problems related to the sales organizations that have yet to be worked out.

The Ryan Aircraft Corporation, makers of the popular Ryan Brougham six-place cabin ship, has developed one of the oldest and most effective organizations in the industry, and some of the policies which have developed this organization may be of interest to the industry.

Starting with the strict policy of closed territory, as a distributor organization, each dealer and distributor is fully protected as all sales made in his territory, regardless of his influence in making the sale. The development of this organization dates back three years, during a period when partners were fighting for delivery of every plane as it came off the production line. The first order of business was that they never wanted to have to compete in a sharp cut and that a national and world-wide system of distribution would be necessary. Thus many thousands of dollars in unnecessary commissions were paid during the last three years, but the policy has resulted in a loyal and an aggressive marketing force, living up to its name.

The next problem upon which the organization has been built is that of giving every possible help to dealers and distributors. The third policy is a strict selection of new dealers and distributor, and the elimination of those that have not made successful sales efforts at the expiration of their contracts. And finally, the fair treatment of all holders of sales franchises.

There are two seemingly contradictory features of sales in the airplane field. First, that when many organizations and individuals are ready for a plane they come to the distributor with little effort on his part, and his sales

problem is to get delivery on the specified date. Second, that there is a vast market for planes in this class that requires more intensive sales efforts to reach the sale of any other product.

However, the dealer makes many sales without a great deal of effort. It is not at all unusual for a dealer, when the distributor never heard of, to walk into his office

and say "Here's my check for a Ryan. When can I get delivery?"

The Ryan organization has always believed that it is essential and fair that the distributor should receive full compensation on the sales made, as well as those made in the factory, which will be discussed later, in order that he may be justified in making an aggressive effort to cover his territory thoroughly, and gradually educate the many potential prospects to the point where a sale will result.

Thus each distributor has a well defined territory, usually a state or part of a state, and in some parts of the South and West, a large territory.

To obtain an exclusive territorial franchise, each distributor must fulfill the following main qualifications:

1. Contract for a certain number of planes per year, depending on the size of the territory and number of potential prospects in that territory.

2. Buy a distributor, and always keep it available for distribution.

3. Have at least one man devoting practically his whole time to airplane sales.

4. Place a deposit on taking the contract to insure fulfillment of all conditions.

These requirements almost automatically eliminate the dealer who does not intend to make a serious sales effort, and the occasional commercial operating company that would obtain a contract to get planes needed for commercial operation at a discount.



D. W. Clephane, President of sales,  
*Ryan Aircraft Corporation*

While these requirements are somewhat more rigid than many manufacturers are demanding, they are necessary to warrant the factory in carrying out its elaborate system of sales helps, and to assure the sales men that once without any sales effort, it is only fair that the distributor make an intensive effort to cover his entire territory completely.

Very few organizations can cover an entire state effectively even in the expensive plane class, and as each distributor is made responsible for developing all the sales territory should show he usually appoints dealers in all large centers near his own office. These dealers work on more or less different commissions, and at times do not maintain demonstrator planes, and do not contract for delivery, number of planes, and do not have full time airplane interests. These commissions are extremely similar to the distributor who takes the entire state responsibility for a state. These values lie in their knowledge of local conditions, and the transportation facilities, habits and financial stability of all individuals and corporations in their territory. They comb their territory for prospects and look up individuals and corporations who have made inquiries at the factory or through the distributor, working with the distributor by the factory, when it is believed to be worth while. It is usually easy to see the distributor already closes the sale, but the distributor's part is to find a potential prospect and educate him in the value of air transportation for business or sport. They then turn up to the distributor to sell him the type of plane best suited to his needs.

These dealers are usually commercial operators of schools, air transport lines, and taxi services, although more and more automobile dealers are entering the field. Other types of organizations have made some success with dealer contracts.

At present practically all of the distributors have some who devote their full time to developing sales of the 20-25 seat plane. This organization is required to radio sales to the large business enterprises which are just beginning to realize the value of owning planes. To assist them in developing these sales the factory has sales representatives with a pilot and a demonstrating plane covering every section of the country. The Ryan organization has realized that the ideal combination of an expert cabin plane pilot and a salesman who is capable of approaching problems of large enterprises, commercial operations and individuals, is the best. Therefore, two men over 2000 hours are employed to pilot the factory demonstrator, and a salesman who is also a pilot and has years of experience in sales methods and approaches him.

This factory sales team with its home model plane makes periodic visits to all distributors and dealers, approaching all prospects within the distributor's territory, and in some cases have held off buying. This brings to the attention of the distributor methods which other distributors have found to bring exceptional results in the sales field, helps him with the preparation of direct mail literature and the selection of salesman and pilots, and guides him in applying knowledge of modern airplane sales methods.

Each dealer with the help of the factory makes up a complete list of all individuals in his territory, having no, nor any interest in aircraft, the purchase of a plane. Another list of all organizations whose business is of such a nature that they could use their own plane profitably is made up. This list is then given over by the distributor's local dealer, and the names of all corporations

and individuals whom it is known would not purchase a plane are struck off. The remainder are then approached personally by a systematic campaign.

Sometimes these prospects are worked on for a period of years before a sale results. To many cases sales follow-up visits and demonstrations are made by the factory representative. In addition the salesman carries on a systematic correspondence with all of these prospects and the distributor is kept informed of the results.

Individuals within the experience of a particular class of enterprises owning airplanes is prepared and used to sell to all corporations in the state. This is a complete, and in some cases, a complete Ryan and the experience of these customers has been compiled together with figures on cost of operation and savings. A general outline of just how one company can use an airplane to advantage is sent to all companies in the field. Other classes of business such as newspapers and large sales organizations are interested in the same fashion and literature outlining a definite plan of airplane use is sent to potential prospects. This literature, describing the advantages of airplane ownership, is still unique enough to get to the flesh of prospects of the largest corporations and as high as a 60 per cent response has been obtained from some of these readings. Prospects thus obtained are passed over to the distributor. The factory sales representative makes a check of all prospects on his visits to review that the distributor is covering his territory effectively.

In addition a publicity department is maintained which sends articles to all publications, to all the large newspapers in the country, and to some 50 magazines and other publications which publish aviation material. Newspapers and magazines are just beginning to realize that there is more news to obtain than the details of a crash, and the more progressive newspapers and magazines are only too glad to have good news material.

To enable intensive working of the territory as outlined the distributors are in many cases requesting less territory. It has been found that a small territory closely worked will bring more results than an attempt to cover a large section.

The distributors have learned that it is necessary to make more than a 15 per cent downpayment to sell the type of prospect that would buy a Ryan. Most of these men have found that if they buy the demonstrating plane and pilot at the disposal of a prospect for several days, making him on an extended business trip, showing him the performance of the plane, the suitability of landing fields, and the time that can be saved under the aerial conditions that the prospect would use a plane.

The Ryan organization has realized that the distributor and dealer must make money before the factory can do so and in this elaborate system is designed to aid them in every possible way. The distributor gets full credit on all sales made in his territory by the factory or the factory sales representative. Allowance is often made for unusual conditions which prevent the distributor the right to claim credit on a sale, but in every case the distributor is given the benefit of any doubt. It is a poor sales organization that cannot earn money under these conditions, and it may be said that every Ryan distributor last year showed a substantial profit on sales. In a set-up of this character there is a place for every organization that wants to enter the airplane sales field, regardless of whether or not it can make the investment in a demonstrator plane required of distributors

# THE AIR-RAIL STATION AT *Port Columbus*

*An Up-To-The-Minute Airport With Special Accommodations for TAT Passengers*

By WALTER E. BURTON

**W**HERE Planes and Trains Meet." So reads the official signatory of Columbus central city of Ohio, over the Port Columbus, the new municipal flying field containing the first air-rail passenger station in the country, in racing conception. Port Columbus is the eastern air terminus of the Transcontinental Air Transport system which operates in cooperation with the Pennsylvania railroad in carrying passengers between New York and Los Angeles. (Its operation was described in detail in the July 1 issue of *Airways*.)

Operation of Port Columbus on July 8, found three buildings with completed, spacious wings and other facilities, including lighting equipment ready, and much of the grading done. At the same time construction work on several new hangars is well under way.

Despite the most interesting features of the airport is the depot in which the rail passenger becomes an air

traveler within a few minutes. On the southern edge of the field are tracks of the Pennsylvania and Baltimore & Ohio railroads. Along these, two 600-ft concrete platforms, surrounded for most of the length by protective iron sheds, have been built. The shed covers and supports supporting a roof which protects passengers and baggage from rain and snow.

After alighting from the train, the passenger walks through a covered passageway into the administration building and passenger depot, a short distance away. This central walk is a temporary feature, and later will be replaced by an underground tunnel to permit a high-speed to be run between the train tracks and depot.

Upon arrival at the depot building, the passenger has his baggage checked and proceeds to obtain his ticket. It is a Department of Commerce rating that the weight of passenger and baggage must be stated before entering



The first TAT station at Port Columbus, showing passenger ship and concrete wings in front of the hangar area.

so airplane. So, as the traveler steps upon a slightly elevated stage—merely a scale platform—his weight and that of his baggage are automatically recorded, without his knowing it.

The ticket obtained, the aircarri passenger proceeds through another covered walk directly to the door of the fast-traveling transport that is to carry him westward. A telescoping screen permits the walk canopy to be retracted, so that the interior of the aircarri as these traveling persons will not be exposed to a personal inspection of the craft, moving the propellers, going in the way of mechanics, and the like. After passengers and baggage are aboard the engines are started, the plane taxied over the asphalt-paved apron to the head of one of the runways ready for the take-off.

**THE ADMINISTRATION BUILDING, BAGGAGE, AND ALL OTHER STRUCTURES** are of the field size of concrete and brick construction. Built enclosed walls with black stamping and slate trim engage form a pleasing combination.

The enclosed passenger depot and administration building has a foundation site of 140x100 ft., is two stories high, and the interior of the second story is an open space with a greatest dimension of 20 ft. This is a glass-enclosed, so that a clear view of all parts of the field is provided. The tower houses the airport weather bureau and the lightning control switchboard. An operator can turn on or extinguish any light on the field merely by moving a lever.

On the first floor, there is a lounge room for women, general passenger waiting room, dining room (especially designed in modernistic design), kitchen, ticket office, baggage room, and, on the outside, an awning-covered terrace from which guests may watch the operation of planes.

The second floor is given over partly to a series of offices for company managing at the field. There is also a room for the local Post Office. Contractors and representatives who occasionally visit the field, a telephone room, sun porch, lounge and showers, and lounge, shower and dressing rooms for women pilots.

The office that has been provided for Department of Commerce use is a somewhat unusual feature. An operator from the department frequently finds that, in visiting an aircarri, he has no place where he can take care of correspondence and other clerical work. Builders of Port Columbus have noted this condition, and have

accordingly fitted out a complete office that is at the disposal of department representatives exclusively.

The present administration building is but a portion of that which eventually will be required. The first annex will be built at the western end so that the octagonal tower will be in the center of the structure, on the field side. There is ample space for other additions south of the present building.

Five hundred feet north and slightly east of the administration building is the first of a series of aircarri hangars. It is one of two that serve as Transcontinental Air Transport operating headquarters.

The TAT hangar is 107 ft. 8 in. wide and 206 ft. long. Door openings are 120x32 ft. maximum. A mezzanine floor running for about half the length of the structure provides storage space, and a series of rooms on one side gives additional space for storage and other purposes. Offices of TAT are in the administration building.

Each of the aircarri hangar sites in this area is 225x300 ft., and restrictions as to size and type of hangar are explained. One has been leased by the Ohio State company for \$10,000 a year. Two have been taken by TAT, and another, a Coast Air Flying Service hangar is being built. A medium hangar, 125x210 ft. and costing about \$10,000 is being put up in another lot. United States Air Lines of Cleveland has leased a site. Universal Air Lines and Western Air Express are negotiating for two lots each. That will dispose of all available space in that section. There are 12 other and slightly larger sites on the north side of the field. These will be used as extension demands.

Port Columbus boasts hangars that represent the last word in landing field practice. A prehanging-wind runway 3,500 ft. long and 300-ft. wide extends northeast-southwest. A 2,800-ft. runway of the same width runs at nearly right angles to that. The prehanging-wind runway is 100 ft. long and is used on approximately eight months of the year.

Runways are connected by a 30-ft. paved taxi strip running the length of the hangar area, and a 120-ft.

Administration building and office and passenger station with aircarri service and control tower at right



concrete apron in front of each lot surrounds the paved area in front of the hangars in 150 ft. Runways and taxi strips are of five-inch concrete covered with a 3.5-in. asphalt header top. In all, there are 95,000 sq.yd. of paving.

Before any building or paving could be done, it was necessary to install a complete drainage system. The limestone bed seen is drained by five-inch tiles made of vitrified shale. This material was found to be superior to the usual forms of drain tile. C. H. Stock, who helped to design the airport and has charge of the construction, conducted extensive trials of tiles before making a selection. It was found that vitrified shale whitened up to 2,200 lb. on three-point suspension, while other tiles broke at about 800 or 900 lb. Further tests were made by burying vitrified shale in a trench which ranged in depth from one to three feet, and by applying the burial tile to the vapor of a heavy motor truck dropped from a height of six inches, the drop being made by driving over a berm at the edge of the filled-in trench. The tile was unbroken, even at 3,100 lb.

The field proper will be covered with a turf of fine blue grass. Seeding and rolling will cost \$15,000. All buildings are fireproofed from the ground, these being of glass-block concrete. A General Electric field fire pump of 250-horsepower motor, costing \$80,000, has been installed. The unit develops 2,000,000 c.p., and gives an average illumination over the field area of 15 foot candles.

On top of the control tower of the administration building are a Coast-Flares revolving beacon of 6,000,000 c.p., and two green-on-white lamps flanking it. Above each is the letters "PC," meaning, obviously, "Port Columbus." The beacon is extremely bright. It has a one-power convex lens of heat-resistant clear glass, designed to direct 85 per cent of the light in a concentrated beam upward at an angle of 25 degrees. A magazine lamp changer automatically lights and throws out focus a space lamp situated at the top of the tower. The beam sweeps through an arc of 360 degrees in 10 cycles per sec., and the successive light dash that occurs for five seconds with an equal interval between. There is an illuminated ground mark and a high "T" for indicating points of ground reference.

A landing light is located on a steel tower 500 ft. from the control tower, which is mounted on the roof of the administration building. It consists of a metal arc graduated in feet, and a search light with pointer. Height of the calling is obtained by turning on the light and leveling the sight on the spot where the beam strikes the cloud layer. Brightness of this spot is read off directly in feet.

All heating of buildings at the airport is done by gas fire. This eliminates all smoke except that which comes from an occasional tree falling nearby.

**PORT COLUMBUS** is the outgrowth of a city-wide campaign conducted about a year ago by residents who realized that local flying facilities were not adequate for possible future development. An \$825,000 bond issue for the building of a municipal airport was voted in November 1938, by a margin of almost five to one. An area of 560 acres on Fish Creek, east of the city, and far from Norden Field, was purchased. The present development includes only 360 acres of this tract. Planning of the port began at once, and has been proceeding under the direction of Stock. William F. Crater has been named superintendent of the airport, with Mr. Stock as assistant.



Showing a large open-top structure on the TAT Annex. This type of design, built with 300 ft. bays, is specified for all hangars.



First Columbus radio station, located about two miles from the flying field

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# Random Observations of an

## AIR TOUR PASSENGER

By EDWARD P. WARNER  
*Editor of *Aerogram**

**T**HE NATIONAL AIR TOUR, which has just wound up its 1939 annual appearance upon the aeronautical calendar, has several distinct purposes. It is a test of the capacities of the aircraft entered, and of the reliability of their power plants and other essential accessories. It is a demonstration to the people of the cities visited, and to the world at large through the press, of the remarkable uniformity with which modern airplanes can travel a fixed course in accordance with a fixed schedule, and of the skillfulness of their crews in both any unusual emergency. It is a tremendous exhibition of modern aeronautics, bringing audiences of all men and types together in communities entirely familiar with the appearance of only a few of the commoner standard makes, communities which ordinarily would not encounter the new developments in airplane design until long after they had passed to non-fiction. An incidental result of the tour, although not one of the objects for which it was organized, is the giving of a very positive spin to a number of the more important segments of the industry to all those participating in a lot of brand-new knowledge about the parts of the American aeronautic industry and their people.

Air touring, even more than racing, depends for its success and usefulness upon the adequacy of the preliminary organization work. As far racing, the organization divides naturally into areas more or less distinct parts. Publicity has to be carefully prepared if the aircraft industry is to get a proper return from the tour. Technical organization has to be performed not only at headquarters where the tour starts and finishes, but at every docking point along the road if the western air to be adequately informed and passengers and crews avoided. There are general and miscellaneous details of arrangement, also spread over them, such as transportation, entertainment, hotel accommodations, the distribution of new information to the tour personnel, and a score of other details, individually small but collectively harassing to the western air and its assistants.

The writer saw the tour as one of the fortunate passengers with no responsibility, able to observe and to enjoy the scenery and the show. Unfortunately for himself he was only able to cover only approximately the first half of the schedule, going as far as Atlanta, but the journey was long enough to develop definite opinions on some phases of air touring in general and this tour in particular.



Captain Ernest Black, later return passenger

covering it and the comparison between allowed and actual time on the previous stretch of the flight. Errors are occasionally to say, computations made under pressure, but in the current tour they have been very few, and have either been caught by the officials in checking their own work or vented spontaneously on being brought to their attention.

An unusual element of the management of the tour was the provision of a separate committee of one for each airplane at each stopping place. The checker so appointed is supposed to guide the machine to its place in the line and see it properly parked, check up on the

The writer saw the tour as one of the fortunate passengers

number of passengers and other load carried to make sure that it fulfills the content requirements, and give any possible advice and assistance to the crew and passengers. The plan worked out admirably in some cases, especially those where a sufficient number of aeronautical experts were readily available. In the Chicago section of the tour, for example, the members of the local business airplane clubs acted as checkers, and since they were familiar with the handling of airplanes they got the competing and accompanying craft off the field and onto the parking lot with admirable efficiency and a minimum of delay.

The tour was true in some American cities, particularly where local auto clubs took over the task. In other communities it was necessary to call upon service clubs, chambers of commerce, Reserve Officers' associations, or other miscellaneous organizations to provide checkers. The managers gave generously of these time, and displayed an admirable enthusiasm and helpfulness, but were frequently handicapped by a complete lack of necessary knowledge, and faced, indeed, periodically, a hopeless task. It is often impossible to find enough people with a fair knowledge of airplanes to go around in a small city with not very intense aeronautical activity, they should be found whenever possible. Despite the partly commercial nature of the tour, the American Legion could probably assume the offer of the services of a substantial number of ex-war pilots in most cities.

The driving up of forty planes into a neat straight line, twice each day, under the marshaling of Captain Black and without external assistance, afforded a beautiful demonstration of ground maneuverability. Whether the planes could make a breakaway all at once, however, the tour did hardly try on off of the large airfield, but still it had to be guided to a place on a line, as five years ago, by mental grilling and hauling the confusion at handling forty planes in half an hour would be endless.

Marion of the difficulties under which the checkers had sometimes to labor leads up naturally to the bolder of the part of service. For at some of the stops he did a large part of the work of the twenty-nine checkers in addition to all of his own. No praise could be too high for Frank M. Black. His experience, his skill as a pilot, his personal popularity, his tact and good judgment all combined to make things run smoothly and to keep everybody, both the tourists and their hosts, contented. From the time that he took off each morning, some two hours ahead of the body of the tour to prepare for its



From an surprisingly large crowd at interested spectators at the new Springfield (Mass.) Airport

arrival at the noon stop and his get through providing the entertainment at the evening's banquet by introducing the pilots to their hosts. He was watching every detail and personally caring for many. One of the manager's greatest problems had been solved when he succeeded to serve as an official.

### Crowds and Their Handling

THE INFLUENCE displayed in most of the cities visited was very encouraging in one sense, surprising in another. It was encouraging as evidence of an interest, and of popular interest in perfectly straight manor flying. It was surprising that there are still so many people who connected with aviation, and presumably not particularly interested in the constructional details of recent planes, to whom flying is still enough of a novelty to lead them to take the trouble to go out to the airport for such a purpose. There could have been no better evidence of the breadth of the field still open for the expansion of our aeronautics and of the comparatively small surprise that it has so far made upon the public. It was particularly striking that the size of the crowd at the various stops by the end of the Springfield, which has a comparatively new airport and no regular air line, beat out a fairly established pattern. So considering the size of the city and the fact that, only a noon stop was made there, did Chicago, with its large and military air operations have been much older stop, had comparatively smaller crowds on hand.

The largest crowd of all was in Montreal, but that can hardly be taken into account in establishing any rule, as an airshow meet was going on there and the arrival of the tour was only one event. The uneven distribution of public interest suggests that the purposes of the tour will best be accomplished in future by keeping it away from great aeronautical

centers. While of course the aviation enthusiasts will never lose interest in the tour in any city, and while they would all like to have it come to visit them every year, it is believed that in future visiting the greatest field possible will be done by visiting such cities as New York, St. Louis, Chicago, and Wichita in favor of more places like Portland, Wisconsin-Sheboygan, and others where there is great aeronautical enthusiasm, but where it has difficulty in finding material enough upon which to feed.

However the tour has raised in the future, it must be suggested upon local organizations recommending that the tour must be kept in mind. The percentage of the field during the first week of the late was varied from approximately 70 percent to approximately 30 percent. In several cases, among which Montreal and Springfield were especially notable because of the size of their crowds and because the limited amount of permanent fencing around the field enhanced the policing problems, the spectators were kept ingeniously back from the machines at all times. In others, they were allowed to invade the field as soon as the planes had landed, and in two or three instances in the southern states there was a virtual absence of any presence of control of any kind. Men, women, and children roamed肆uously about between the airplanes while their engines were being warmed up for the take-off, and the absence of facilities by welfare tour representatives can be credited only to the general indifference. The tour has been a pleasure as far as possible, and if the tour is to accomplish its full mission for air transport they should have the opportunity, but they ought not to be left the field until every machine is ready to position and out the switch, and they ought to be off again before active preparations for the take-off are started. Furthermore, there should be enough guards locally provided to keep visitors from climbing over the till surfaces without respecting the duty of policing an already fatigued machine. Those are franky sounds of perfection. It is realized that it is very difficult to get enough volunteers or enough of a whole to have men everywhere that they are needed, but certainly local committees should realize that they are

accepting a serious responsibility in undertaking to receive the tour and that it is up to them to maintain proper conditions.

The local committees have as another of their duties the provision of transportation and accommodations. In most cases that part of the arrangements was well handled. Where it broke down it was usually because there was not enough detailed cooperation and not full knowledge of what was going to happen to make the arrangements worthwhile. The air tour management has now had five years of experience with these events. We should have no trouble in the future where it becomes possible to standardize the procedure of government transportation and lodging as far as entitled to them. In some cases there was great trouble to have little books of tickets printed, and there found it impossible to find out who should get which books. In other cases the distribution of the books was entrusted to an individual who could seldom be located when wanted. In other instances budgets were issued, supposed to cover everything. All this variety of procedures left the pilots and mechanics whom expenses were supposed to be paid at each stop somewhat uncertain about what they were required to secure and where from, and the managers would assume that a number of them paying their own hotel bills in consequence. If all cities were to be similarly provided with a great deal of organization could be avoided both for the tourists and for the reception committee members. Ray Collier would have been spared a heavy burden. To avoid the necessity of having the manager carry a lot of pilots, mechanics, and assistants around with him to be handled over as the local people on his arrival at each stop, some standardized and non-negotiable identifying credential should be given to those entitled to official entertainment. If a definitely limited number of credential cards were issued, carrying a photograph or signature for identification, like the identification passes at the Cleveland Races, the recipients could be made collectively responsible for their safe-keeping and accommodations could be issued without delay to the holder of a card, but only upon his presentation. Scrutinizing of the tour, arranged by the manager of the tour, is entirely responsible to receive the load both upon the tour manager and upon the local organization co-operating.

The pilots want not only lodgings and meals, but also information about what is to happen next. The management assumed the task of presenting route maps to all planes. As far as the writer accompanied the tour that was working out very smoothly except in Canada and northern New England, where the failure of the supply of regular air mail left a number of pilots stricken through the White Mountains and a lot of thick weather with no set other than a highway map haphazardly scraped up in Montreal in the morning of departure.



When the record and a chance to see the Rockies—Wings-States

Plans do not always cover all the planes' need for information, and confusion sometimes results from the difficulty of gathering all the flying personnel in one place at one time to receive instructions. It would be well if the statistical service that has accompanied the tour and performed a valuable service for some years past could in the future be supplemented by a clerical department and a light duplicating machine to run off a mimeographed information release for the pilots in each stop. A simple machine capable of making a hundred copies of a brief release in fifteen minutes weighs only six pounds. As an example of the difficulties of reaching everybody by word of mouth was mentioned whenever suggestions were to be made about the route. On the Toronto-Ottawa leg, for example, which passed for easy sailing over a thickly wooded country in which landing fields would be sought, when Capt. Rauch had advised that they keep off the roads, the north and the lake shore, to the two-thirds of the distance and then turn sharply to the northeast to Ottawa. To be sure, most of the pilots who did receive that information gave it out the slightest hand, drove the airfield and destroyed their brethren both in their power-plane, but a number were unable to recall ever having received the suggestion at all. The organization ought if possible to provide pilots that wherever there are more than ten or fifteen minutes available to get information and distribute it, it should be put into every pilot's hand in printed form.

#### Airplane and Air-fishing

PARASAILING, free from any of the writers that might lead the pilot could devise himself to surveying objectives the aeronaut and aeronauts as revealed in the tour reports. A number of the tour with that of two years ago, and knowledge of the field goes on over 1937 at some of the fields then reached, leads one to conclude that aeronauts are increasing enormously. Not only are they increasing in numbers, but standards are being raised and landing areas enlarged. The only real criticism that could be made is that some of the fields were so rolling as to be very dangerous in a pilot coming in with a heavily loaded machine and having no previous experience with the local conditions, while others were too soft to be really suitable for large transport planes. The latter complaint, however, applies pretty well of the great number of machines handled at the tour and the possibility of getting all of them down on narrow runways when several were coming in to land simultaneously. Where the field surface is salt good runways are an almost all cases either new in existence or resurfaced for the tour liaison, although the Canadian seem inclined to hold with the European theory that runways are not ad-



The Trans-States Fleet at Binghamton, New York

quate and that the entire landing area should be of uniform quality.

Leaving out of consideration the very large drag, the airport problems of which are well known, most of the communities visited have adjusted their cities with due regard to the importance of having time in getting to the place where the most time-saving of all vehicles is to be entered. Only in very few instances did it take over fifteen minutes to travel between airport and hotel or railroad station. The only notable exception to this rule occurred in Milwaukee, where the time was taken to walk the six or seven feet and a half to their and a half hours, but these abnormal delays were attributable to location of the airport, although it is rather far out from the city, due to the embankment which lead about 20,000 people out to the field on the afternoon of the tour's arrival and produced a complete堵塞 of the highway. The approaches to the airport at St. Hubert are most unsatisfactory, but that is a situation with which the Dominion's aeronautic authorities are valiantly struggling.

Airports, as far as they appeared along the tour, are passably good, although of course these cities known to have fairly satisfactory fields were located in the states. Not so much can be said for the aeronautics of Canada, where cities have had to meet convenience and elaboration during the last two or three years. During the first eight days of the tour the planes passed over some hundreds of cities and villages of varying size, and except on a possibly few instances they rarely lacked means of identification from the air. The Post Office Department, the Aeromarine League, the Guggenheim Fund, the Exchange Club, and various other national organizations have equipped themselves upon air-marking propaganda. Moreover by absolute magnitudes the results of their mappings here no doubt have very considerable, but the communities worked are spread out so well across the United States, at least in the Atlantic Coast area, that the pilot losing his way on coast lines will exceptionally fortunate if he happens to come within sight of a road sign. To say among a number of pilots and passengers on the tour failed to reveal any individual who has seen more than four or five marked towns in some 2,500 miles of flying and their collective reports

put together showed less than a dozen such signs observed in all, most of them in New England and in Georgia.

#### The Power of the Tires

**T**HE TOUR always offers the occasion for a great amount of discussion of how the rules can be improved for next year, both as to general provisions and lay-out of routes and as to the detailed application of the formula for picking the print winners.

There are some general requirements which should be improved in the application of the tour, but there are no general commercial types, either for transport or for private operation. Among other things there should be absolute insistence upon the provision of a start. It is very disturbing in these days to see an engine being started by cranking the propeller with the wrench on a is a commercial reliability loss in the year 1939 there is no possible excuse for such a situation. The probability of touching the propeller to start should be absolutely legal.

Another subject that calls for current consideration by the management is the classification and division into groups of the competing planes. Airplanes now vary so much in size, performance, and intended function that it is quite logical to have the tour divided into groups according to any sort of compromise. It is clear that the size for division is at hand, and that those should naturally be separate classes for multi-engine transport planes, for single-engine cabin machines, and for those with open cockpits, corresponding as general as the three purposes of airline operation, private transportation, and sport flying.

The writer even considers that it would be desirable to consider sending the several sections over different routes, at least in part. The number of planes accompanying the tour has tended steadily to increase. It is already so large that the handling becomes a decided burden in itself in a small city. Assuming that the fleet will continue to grow larger, space good would be half as many as there are now. It is not an unusual idea, incidentally, that there are some consequences which would only add encouragement and have fields admirable for retaining a group of small planes but not of such size or stability as to make them safe for use by transport types.

Another advantage in splitting up the group would be that multi-engine machines, when enough of them shall be participating to make a satisfactory tour by themselves, could be sent over a route that would be dangerous for planes depending upon a single powerplant. A gross question of safety is involved in running the tour over such areas as those between Toronto and Ottawa, Montreal and Portland, or Augusta and Jacksonville. On any one of the three there were stretches of many miles with no possible landing points within reach, and areas where the regular factor of any single-engine plane would have instant sterilization and serious crash. No failure occurred, and the fact is much in the credit of the reliability of the modern aircraft powerplant, but let us never be so sanguine in any mechanization and the writer believes that it is neverwise in the long run to try the course of single-engine planes over any territory requiring the pilots to strike everything on their engines for a considerable period. It may be argued that many of the purchasers of the planes would have to be prepared to fly over this kind of country, but they can take the responsibility of their own eyes. To the conduct of the air tour the responsibility is with the management.

and the management has to do everything possible to cut the likelihood of serious crash down to the very limit. Furthermore, the private traveler by air is not under the same temptation to keep pushing along in spite of major indications of trouble as is an air tourist flying to maintain a schedule, nor is he so likely to seek to dodge the effect of head winds by dropping down to slant along a low-level flight above the tree-tops and the swamp.

There is not one of the factors that has been mentioned here that does not visibly reflect the judgment of the tour as the convenience or importance of the competition. All of these factors, however, have hardly a tendency to which division as has the exact form of the formula by which the scores are determined.

Whatever possibilities of improvement in the formula may be found now, upon past history it must be accredited a masterpiece. For four years it has remained without fundamental change. That probably suits a world record.

The present formula is

$$\text{Score} = \frac{100}{\text{Total time}} \times \frac{\text{Total displacement}}{\text{Distance from start} + \frac{1}{2} \text{Distance to finish}}$$

Its implications, and the precise type of design that it favors, are to be made the subject of detailed study in a future article. For the present, it is necessary only to consider exactly howdly what qualities are most desired in a transport plane, and to see how they enter into the present rule.

Broadly speaking, economy, safety, and speed are the qualities most sought. Speed enters the formula directly. Safety is levered by a liberal reserve of power and by a low loading load. Both of these characteristics enter into the determination of take-off on "stick" time, and the latter of the two in the principal dimension of "stick" time. In giving great weight to the time required for getting into the air and for coming to rest after landing, the tour formula is stressing elements very favorable to safety.

#### Economy and the Tour Formula

IT AVE always without stress upon economy in making the figures of merit proportional to the useful load carried per unit of power. The economy factor might well be increased more directly by the inclusion of fuel consumption in the formula. The suggestion is not from those who think with emphasis in the technical arrangement of competition always "cost is silver." The opportunity for saving on the part of the competitor is tremendous. The cost of fuel is the only item that can be guaranteed to remain constant. It is, of course, at the expense of another. The weight given to the "stick" time was reduced in the rules for this year's tour because of a feeling that machines of a very light wing loading and with exceptionally powerful engines had been put in an unfairly favorable position on the part.

It is felt, for granted that the measurement of landing and take-off times is not suitable to a tour, the cut-and-dried nature of the tour results could be refined by using a liberalized determination of those times at various points along the route. Some of the pilots have suggested that such and such speeds ought to be maintained at every crossroads. That would be academically impracticable, but the work could well be done at four or five selected points and a fair result would be obtained if the average of several different kinds of fields were used in getting the figures. In a single measurement such may depend on time, and the time taken on the concrete runways of the Aeroflot airport will not necessarily be an true proportion to those on the more ordinary surfaces of cities and on roads.



ROOSEVELT AIRPORT, October 8, 1939. Before the departure for New York

are always at least half the competitors who know as soon as their figures of merit are determined that they have an opportunity to improve their efforts thereafter, to finish within the prize-winning group. The pilot obtaining the highest figure of merit is not necessarily the winner of the tour, but he knows in advance that he cannot lose if he keeps on his course and has no mechanical trouble. In the review event the first three places went to the three machines ranking the highest figures of merit, and in the same order. So much postdetermination takes the edge off of the tour.

Whether one may go into the formula, the "stick" and "start" times should remain in some form. Their original inclusion was a stroke of genius. They are comparatively easy to measure, they are ample enough so that everyone can understand what is being done, and they promote the entry of planes having certain good commercial characteristics. It is, of course, to oversimplify commercial quality at the expense of another. The weight given to the "stick" time was reduced in the rules for this year's tour because of a feeling that machines of a very light wing loading and with exceptionally powerful engines had been put in an unfairly favorable position on the part.

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#### Limitation of Contest Load

ONCE more will be made to the suggested limitation of the amount of weight that may be taken on the ground if full load has to be carried throughout the tour. At present a 25 per cent reduction in the contest load is permitted in the interest of safety, a ruling introduced since the experiences of 1926 and 1927, when some

planes took off with such enormous contest loads that they could hardly stagger into the air within the confines of the smallest fields used. The way out of that dilemma is obvious.

The present limitation of the contest load to the figure provided by the Department of Commerce approved type certificate goes only indirectly to the point of interest. The structural factor is the one primarily bearing the Department of Commerce's approval upon the load to be carried. Structural safety is of course the chief concern, but the load in the tour is the maximum load imposed by performance which use of interest. The writer suggests that no machine should be permitted to have its merit factor above a certain time of over twelve seconds. If the time taken in the final event that figure, the pilot should be required to reduce his contest load and my again until he gets below the allowed maximum. The full contest load could thus be carried throughout the tour with perfect propriety.

A rather casual survey of the formula's working, with no detailed mathematical analysis, suggests only one additional change as desirable. There should be no soaring on very short legs. It is good to pencil a point a half mile or two off the figure of merit for so long a time that the load of weight, free from drag and gravity, would have been almost negligible on the Detroit-Woodrow leg this year, the distance and the time allowed being so short that not even by flying at full throttle could a pilot have made up for more than a few seconds of time lost in taking off or landing. It would be best to have as light of load as thirty miles length in the future, or if it is necessary to fly a shorter distance than that, two legs should be joined together upon a high and flying nose and treated as a single car for computing the score.

The tour can no doubt be improved, and will be, but it stands now as probably the most valuable of American competitive events in its field. It offers an open forum of the merits of the various types of aircraft used in commercial aviation. The continuous migration of commercial reliability losses in other parts of the world is the best evidence of the general high opinion of their value. The tour will continue a useful and an important one for many years to come, and any reader who has a chance of going along with the commercial aeronauts near year should turn upon it without delay.



## Value of August Aero Exports \$617,224

WASHINGTON (c. e.)—Canadian aircraft exports, including the value of aircraft and parts exported from this country the month of August, reports show, while it stood highest on the export list of aero engines, according to the latest statistics issued by the Bureau of Customs, Bureau of Foreign and Domestic Commerce, \$88,188, was the value of the six planes sent out, while the three engines represented \$11,000, and parts, \$10,624.

Japan stood second in the number of craft shipped, with four valued at a total of \$60,976, while these planes were shipped to the United States, Canada, China, Japan, and the Philippines, at \$22,680 and \$16,457, respectively. Other countries to which merchandise was sent were, Norway, two, value \$11,000; Panama, one, value \$5,000; Argentina, one, value \$2,000; and Peru, one, value \$1,673, Brazil, one, value \$2,475.

Imports were also disclosed by Bureau of Customs, Board, Peru and Paria River. The first year of the Bureau the amount of imports was \$12,300, the third, and valued at \$1,499, the fourth, valued at \$11,450 and the fifth, two, valued at \$1,418. Twenty-three craft, two types besides these, were shipped from the United States, and their total value, they were, Belgian, \$7,965; France, \$7,471; Italy, \$7,386; Italy, \$1,155; Netherlands, \$5,233; Poland and Germany, \$1,200; Russia, \$1,000; Spain, \$2,143; United States, \$1,000; British Honduras, \$67; Panama, \$1,420; Mexico, \$4,373; Cuba, \$3,022; Argentina, \$480; Brazil, \$2,164; Colombia, \$2,071; Peru, \$4,381; China, \$1,916; Japan, \$1,440; Korea, \$1,000; and the British Islands, \$2,712. Total, \$66,494; America, \$1,089; New Zealand, \$484; Hawaii, \$285.

### Half to Planes in September

Advance Square for September show exportation of 30 aircraft valued at \$68,500, in comparison to 17 planes with a value of \$617,224 exported September 1928. The increase in the value of the exports over the year, extended from eight in September, 1928, to 26 in the same month of this year, a monetary growth of from \$60,976 to \$75,767. Aircraft parts, however, did not increase, nor did aircraft, have shown a steady increase, developing from \$11,000 in September, 1928, to \$15,227 the same month.

Exports of aircraft, as many countries have been informed in the first three quarters of this year, during the same period last year, the value rising from \$1,479,882 to \$4,533,436. Exports of engines during the same period, however, decreased from \$1,367,090 to \$1,367,090. The increase during this time in aircraft parts and accessories, excepting none, has been somewhat slower, extending from \$1,000-\$400 to \$1,626,215, according to the statistics which has been issued.

## New York Air Police in Training

SHIPPING REPORT (cont.)—With more than half of the company's machinery and equipment moved from the College Post, L. I., plane, Southern Aviation Corporation, has started on a systematic program of training in the new factory here. Beginning Nov. 1, the first 120-plate-made struts of twenty plates will come from the assembly line at the rate of one a day for each three hours of work.

The task of solving some of machinery and hundreds of men from College Post to Brooklyn has been under way for months. The new auditorium, tank shop, paint shop, and the 100,000 square foot plant, the last of which is now under construction, are already installed in the new plant.

From Silverstein, vice-president, in charge of production, and Captain Charles E. Clegg, chief engineer, have been busily occupying their new offices for more time. At present the tool, wing, paint, and dope departments are now well along, while these sections are in close touch with the sales and production departments.

Outcomes of this kind of business expansion, the College Post plane will be retained under a series of company apprenticeship training contracts, are completed, which will be shown Feb. 1. The flight of the first Bredenbeck-built amphibian is now under way. Several planes which have been built on a cost basis have been cross-hatched by service department mechanics.

### Great Bunting SB-3 New \$3,500

MARSHALL (cont.)—National Beauty Airplane Company, located here, announced a reduction in the price of its Great-Bunting Bunting, a single-seat plane from \$4,050 to \$3,600, due to lowered costs of the Great engine in quantity lots. The Great power plant is a product of American Sulzer. The Great aircraft is manufactured in this country by the Fairchild Aircraft Manufacturing Company of Farmington, N. Y.

### Vickers British Charge Policy

Montreal (cont.)—Canadian Vickers Ltd., has decided to discontinue the production of lead plates and coverings in the manufacture of explosives taking rhythmic. Wings are of wood construction with fabric covering.



The British-Vickers biplane has a single-seat cockpit, designed to give the pilot visibility both above and below the wing.

## Sikorsky Bridgeport Production Starts Nov. 1

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## Los Angeles Meetings Of S.A.E. Are Announced

LOS ANGELES (cont.)—Twenty days ago, or earlier, have received application for the Los Angeles meeting of the Society of Automotive Engineers and the Aerospace Chamber of Commerce, during the All-Western Aircraft Show, which will be announced in full.

Tuesday Nov. 12, & 15 p.m.; drama, Southern California Section of Automotive Engineers; Hotel Alhambra.

Wednesday, 13th—Meetings of the Aerospace Chamber of Commerce, Hotel Alhambra; President of Harry A. Miller, Inc., chairman, manufacturer and operating members of aerospace engineers. Hotel Alhambra. Wednesday, 13th—Meetings of the Aerospace Chamber of Commerce, Hotel Alhambra; President of Harry A. Miller, Inc., chairman, manufacturer and operating members of aerospace engineers. Hotel Alhambra.

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Unhappily, however, there are several important parts which have been discarded on the ship. For instance, the main motor driving upon the main or Diesel engines, the main gas "sacrificial" 44 tons of gas load, holding that safety is more important than the stage does permit. Next, the ship's 120-ton gas given by Comander Burley was not accepted by the Air Ministry as the total displacement of the ship, and the only figure officially given is 131,100 tons. The difference would, in addition to the 120-ton gas, be 100 tons, so that on these two items alone there is a discrepancy of either five or four tons, equivalent in a load of 26-38 passengers amounting, in the Air Ministry's view, to seven passengers in the ship.

It is also admitted that there is much extra weight in the ships which may easily prove unnecessary for combat purposes. For instance, the first start every control has been duplicated, a heavy motor for the rudder, which was to be a pure luxury, weight being a part of the fueling gauges for liquids, and the following two air compressors are compressed are duplicated; wherever there has been one doubt, the fuel has been made a permanent gimp. Even strength, the calculations of the ship's weight when loaded with 2000 lb. There is, in fact, plausible evidence that if another ship were laid down, it would never serve less well than in the same structure weight alone, and leaving the ship's weight to the engine installation, where it is a very strong case for assuming that there is nothing fundamentally wrong in the design as to the present carrying capacity of the ship, with the burden of proof lying with the designer.

In regard to speed, apparently the reservation of one engine partly for going astern has not cut down the power for long distance purposes.

There is, in a technical sense, in the fact that the ship's engines can actually agree that a speed of 99 mph would be desirable, for whereas Comander Burley has the ship's speed in his statement, the ever cautious Comander Burley has worked out graphs which show that at present it is not possible to obtain that speed economically.

In other words, the ship's engines are recommended to the speed of most aircraft, so there is no use for airships, and none speeds above 60 mph are considered, the engine power needed to maintain the required service weight and fuel load being equal to speeds in other aircraft.

Comander Burley also attacks the Air Ministry's system of rating by a high figure, a procedure which he has never understood, and says that it is no use to compare the ship's speed with airships to commercial which has to rely upon this system and can only be maintained as a load by hundreds of tons under favorable conditions. He makes a great point of the difference in the rating of the ship in equilibrium at 200-ft. east, and then declares that this alone among vehicles

to go today, airships cannot make a landing by themselves and without assistance from the sea. He lays down the principle that this is the case, and that it is no use to load upon the ship's deck more than she can stand upon any day in the year, and that she must be able to ride in a 45 mph wind which any ship can do. The ship's deck is not the place to evaluate her strength, but the landing and docking such systems. The man is telescope, and the man's idea is that after the landing is secured to the ship, the man can be lowered and the ship can be secured to the dock.

However, also vessels showing the ship at a standstill which is in a seacock, is presumably 100-150 ft. high. When secured the ship is in a position to be loaded, and when loaded as when secured to the dock is 200 ft. Comander Burley rather often says that seafarers also no cause to go as upwind or as downwind to assist in a figure of three tons as the extra weight, and admits that it will require an increase in the size of the ship to obtain the same performance as that of a 1000-ton ship. To avoid this, he proposes to run side piers from the stern to the ship and so restrain the ship, while the bottom of the ship, which is the hull, is not restrained, so that the ship and man can always be owing to wind and then moved by power straight into the ship.

Another new idea in the Burley-Peterson system is the use of a mixture of fuel gas and heavy oil in used and some of the experts are pleased towards the rear of the ship in much the same position as in the present system. The ship's weight is reduced by reducing the length-diameter ratio to 4 to 7.5 it will be possible even though the weight is upon the tail. The engines are moved to the rear, and the ship's weight is reduced by the use of a variable pitch propeller in varying directions.

The installation of the Herreshoff Propulsion System? Comander Burley claims: "In a ship of the 10,000 tons would there be a saving of 1000 tons in the ship's weight, and enable a vessel of 90 in. in length to hold the combination of the Herreshoff propeller and the ship's weight in equilibrium at 200-ft. east, and can therefore be loaded to the limit in the extra weight of the float."

A ship designed for the Atlantic service would have a minimum Comander Burley says, could have the following characteristics: Displacement 350 tons, carrying speed 90-100 miles, range at cruising speed, 2,000-3,000 miles per load, 20 tons. The ship would have 100 passengers and 20 tons of freight to be loaded.

The third ship is more revolutionary still, and is of an elliptical ship with two low flats under the mid-section to enable it to alight on water without a flying bridge. The ship's design satisfies four fundamental objectives:

(1) The reduction of the weight in air load when it is loaded and stored in store.

(2) The overall height of the vessel is reduced, thus saving the cost of the ship's deck to be accommodated.

(3) The elliptical shape enables the load to be 100 tons within width, instead of the 100 tons within the length, the diameter of 60 ft.

"To illustrate how such a vessel will be operated we will suppose that the height of the longitudinal axis of the

ship is 80 ft above the water line and that the distance apart of the flats is also 80 ft and furthermore that a 100-ton load is to be carried in the form of 100 tons 120 tons upon the side of the ship. In order to keep the ship from being blown over in a 25 mph. side wind we shall require that the load be secured to the deck so that one end is 100 ft above the water and the other to pull down with 120 tons. Obviously, therefore, each deck must have a buoyancy of over 100 tons and at the same time require an increase in the weight of the ship to the extent of 100-150 tons. To avoid this, the ship must be loaded with 120 tons of water by means of screws, and so soon as they are full the ship can be stopped and will then float steady on the boat deck. The ship can then be loaded with 100 tons of fuel oil, and finally the same way as a carrier vessel and will be approximately load to wind.

As soon as the ship is in the Italian trades are opened the ship will run on a 140° course, and will be loaded with 140 tons of water as if being heated by

boiling the advantages of the new system will take off. As a concrete example, Comander Burley claims that the ship will be 100 tons lighter at 200-ft. east, and that the ship will have a saving of 100 tons, or 70 tons at least, must be secured as emergency ballast owing to the ship having to make a stable position in the event of a 100-ton increase in the ship's weight or to bring her to a safe flying level of any 200-ft. The available lift is then reduced from 64 to 481 tons, and at least 36 tons of fuel oil must be carried in the ship's hold, leaving only 329 tons for pay load. With the new design it would be possible to generate the ship like a flying boat, driving her into the wind and raising her from the water like a flying boat, leaving only 164 tons. The saving of these savings, amounting to 7 tons, against 16, it is 100 tons of fuel oil, to 2000 ft. It is 2000 ft. to 2000 ft. and 41 tons of fuel oil, leaving only 164 tons. In case of emergency, the ship can then be loaded to the limit in the extra weight of the float.

A ship designed for the Atlantic service would have a minimum Comander Burley says, could have the following characteristics: Displacement 350 tons, carrying speed 90-100 miles, range at cruising speed, 2,000-3,000 miles per load, 20 tons. The ship would have 100 passengers and 20 tons of freight to be loaded.

This arrangement of loads and setting marks is analogous when landing at a field where the barometric pressure or the altitude is different from the conditions existing on the field from which the take off was made.

The Comander Burley is very closely calibrated and thoroughly compensated for any changes in temperature. The dial is fixed so that the zero point always remains in the same position on top of the dial.

As the hand quickly indicates comparatively small changes in altitude the instrument is an accurate climb and descent indicator.

# THE BUYER'S LOG BOOK



## Kolhmann Sensitive Altimeter

**T**HIS sensitive altimeter used recently by Lieut. James H. Doobie in his blind flights, carried on in connection with series of experiments sponsored by the Goedeberg Fund, was developed by the Kolhmann Instrument Company in Brooklyn, N. Y. While it is a self-contained instrument for ordinary use, more accurate results may be obtained by connecting the instrument with a strobic timer similar to that used with the Kolhmann landing altimeter.

The Kolhmann altimeter is essentially an extremely sensitive pressure gauge operated by transmitter and receiver. The dial is graduated in units of height instead of units of pressure, according to the 1/2" altimeter calibrations standard.

It is a 2 1/2-in. round dial instrument and is interchangeable with any standard altimeter altimeter. The instrument has two hands similar to that arrangement in those on a clock, each moving over its own scale. One scale is graduated in hundreds of feet with subdivisions of ten feet, while the other scale is graduated in thousands of feet. The range of the instrument is 20,000 ft. The hand in the large scale goes through twenty complete oscillations in reaching an altitude of 20,000 ft., while the position on the small scale goes through one complete revolution. In registering a change in altitude of the instrument it is necessary to hold the dial in the hand for 10 sec. to allow for a difference of 10 ft. in the position of the dial in 1/2 sec. It is therefore evident that this altimeter can be read very accurately. The dial of the Kolhmann altimeter is divided into the hands and over setting marks may be rotated by an adjustable lock so that any altitude above or below sea level may be taken as zero.

Both the hands and the setting marks function in such a manner that when the hands are set at zero before taking off from a field, the setting marks indicate the height of the field above sea level at normal barometric pressure or the barometric pressure expressed in feet of altitude. After the take off, the hands will register the altitude above the field. The altimeter may also be set with setting marks at the zero and the hands will then indicate the height of the field above sea level at normal barometric pressure or the barometric pressure expressed in feet of altitude up to 20,000 ft.

This arrangement of hands and setting marks is analogous when landing at a field where the barometric pressure or the altitude is different from the conditions existing on the field from which the take off was made.

The Kolhmann altimeter is very closely calibrated and thoroughly compensated for any changes in temperature. The dial is fixed so that the zero point always remains in the same position on top of the dial.

As the hand quickly indicates comparatively small changes in altitude the instrument is an accurate climb and descent indicator.

## Bicker Pitch and Bank Indicator

**A** NEW model of combination pitch and bank indicator is announced by the Bicker Instrument Company, 1939-21 Fairmount Avenue, Philadelphia, Pa. The instrument accurately shows at a glance the angle of ascent or descent, or whether the nose of the plane is up or down. The bank indicator scale registers an angle from the current bank angle, and shows whether the plane is slipping or skidding, so the steering steel bell will remain in the center near zero when the proper amount of both controls is used.

## TRADE CATALOGS

**M**ATERIALS AND TOOLS.—A booklet, 24 pages in length, concerning a brief history of the plant of the Brown & Sharpe Company, Providence, R. I., and advertising service of the products manufactured by the concern, has just been issued. This booklet is illustrated by photographs of historic interest of the plant, as well as several of the products mentioned.

**ROCK PRODUCTS—Aeronautical products manufactured by the Russell Manufacturing Company, New York, are described in a 16-page catalog issued by this company. Among the products listed in this catalog are air maps, shock cord, instrument cord, leather and safety belt material, parabolic harness, and others.**

**NAFER ENGINES**—A 28-page booklet entitled "Some Famous Air Achievements" has been published recently by D. Naper & Son, Ltd., London, England. This booklet is in both English and French and is probably chambered with cuttings. Illustrations of a number of the Naper powered record breaking planes and brief statistics of the circumstances under which each record was established, constitutes the contents of the booklet.

**AIR LIGHTING EQUIPMENT**—The B. B. T. Corporation of America has recently issued a 15-page booklet describing several types of landing field lights and beacons and aerial "Safe Landing" lighting. Illustrations of the products and the principles of operation, as well as diagrams showing the angles of elevation and the radius of light through Fresnel lens, is presented as well as information regarding the requirements for safe illumination of landing fields.

**AIR COOLERS**—Catalog No. 350 issued by the Marsh Manufacturing Company, Bridgeport, Conn., describes the complete line of Marsh air coolers. It also contains valuable information for use in choosing proper types and size of an air compressor, for garage and service station buildings, as well as other purposes. A number of accessories for use in connection with air compressors and air systems are also described.

**STEEL WORK BENCHES**—A new bulletin has been issued by the Standard Pressed Steel Company, Jeannette, Pa., describing the "Elliott-Warren." This bulletin is particularly devoted to a type of work bench developed through the combined efforts of the Standard Pressed Steel Company and the Western Electric Co.



Kolhmann Altimeter

Photo: Bicker



## SIDE SLIPS

By  
Robert R. Gibson

AT THE Prince of Wales has long been a favorite of the flying. It is the last few years without any change we are convinced that he could make use of but other favorite sports a lot safer by the simple addition of a safety belt to a seat belt.

We agree with the critics at Langley that the new Douglas DC-10 will not meet the performance promises made for it by its designers, —in fact we've had no all alone. At the very beginning, we observe, they never said it would be the last word in public. It is a well-known fact that as was stated in the press, and we read that it would really turn out that not more than a four or five course dinner could be served. The first class was to be a bit more expensive, but the second was not opened until mid-October when we're right. The papers say "Chief Steward Savidge and Cook Marshall had prepared a tasty but sumptuous meal consisting of roast chicken, buttered carrots, fresh salad, cheese and coffee." If the kitchen is surprised and a Langley Field meal is used they might be able to make a six course dinner, but never never.

Mr. W. P. of Montgomery, Alabama, sends us an issue from the Birmingham News in which Justice Peter said that we must have a new law to prohibit foreign interests from developing. After reading all of the publicity concerned with the Douglas DC-10 which is equipped with a number of unique features, we are sure that it is a success in small type. See Juan, Puerto Rico Sept. 21—Col. Koski, piloting the first West Indies Air Lines flight, a large 100-passenger aircraft, arrived at the flying field here yesterday.

Along with the above clipping, W. P. sends a note concerning one of the latest improvements in southern strung-wire cycles, which needs to emphasize that as a prospective law Florida road cause. "We have an answer, we will be in a 100,000 square foot approach to a 100,000 square foot for sky flying. Large modern brick and steel hangar and a club house on the grounds—one of the best in the south, we are sure, of Jersey City, Montgomery, Alabama, where cost is 10 cents a pound and ours is 95 cents a pound."

### TRUE WOMEN ATTENDERS AERONAUTICAL EVENT

"A strong emphasis, both along the lines of the German Dornier 210, will be laid for Mr. G. Wood." Now Farnborough.

In the following description of the German flying boat which will be built for Mr. Wood, we read: "The lower deck contains fifteen compartments, as the first cabin is built in the rear of the hull, there is enclosed room, passenger washroom, port and starboard rouna for heating and fishing gear, sleeping room, bath and shower, gymnasium, crew's room, and a room for the cook and crew's washroom. On the upper deck will be the pilot and navigation station, with radio room, the radio room with an extra emergency radio set."

The paper goes on to say: "Mr. Wood, the supervisor of such a ship, if it were ever, though, we'll think up better names for the room than those mentioned. It is not unusual to put such a name, consisting of the first letter of your first name and the name of the place. We shall have our cabin named in the first cabin built."

There seems to be an intense rivalry between the past and past to win a award in the American aviation and it is not a secret that some of the most distinguished and most of these awards represent that the other setting aside. At the time that the Gold Angelus was the dinner tray given to the first flight from New York to Los Angeles, W.H. Rogers announced that all Western fields were surrounded by high tension lines, and it will be simply following such lines to the door of the first flight. When we were in the Roosevelt Field on Long Island, formerly Carter, had a very modern high-tension line put in at the rate of 100 feet. It is our understanding that the other two fields will be up to soon so the contest can be set out.

The Curtis Aeroplane and Motor Company was now been flooded with orders from Wichita, Kan., for its "Condor" biplane ship if the new R. J. 10, reported having found "the" in the "Vulture" Eagle was believed by the reader.

"Today's log of the past, finished with defensive exercises for the Car-

ter 350,000-seat airport in which approximately 150 planes, ranging from the old Curtiss type pusher to the Curtiss 18-passenger Condor participated in view of 40,000 people.

We use by the papers that Grover Whalen, New York's police commissioner, has sent word of his men to accompany Mr. Wood to the airport so far as that they will be on hand to see that no piloting are cracked. That would be wonderful for the men assigned to interview them. Think of the privilege of being paid to interview a pilot.

If New York's usual policemen are going as follows all of the traditional run down for policemen in the name of the police, the men assigned to Mr. Wood will be fitted with trading books for advertising business and apples from the fruit stand as they fly their hours overheard.

We don't know just what qualifications were used in selecting the policemen to be given this high ranking, but we are sure for one thing, that they are supposed to have an extremely forced and highly original vocabulary. The average cop can easily using a truck driver or transporter with the words "Lugger" and "Lugger" with the words "Lugger" and "Lugger" more than a hundred words in the pocket book. As an illustration for interpreting this, leading out evidence, the cop will be asked to identify a man. There is no need to have the man after several bad findings and then name new words and different ways of answering the old words.

Capt. F. C. A. of San Francisco, Calif., reports another interesting case of the American Society of the Surveyor Extraordinary Council of the Society for the Aeronautical Education of Artists and Newspaper Reporters. The news is from an Oklahoma paper:

"Miss America, Barbara, American actress, was the first to be seen in the girl known as 'Lady Lady' who was the first woman to fly the Atlantic Ocean, will drop down from the sky into Orlando airport next month with the help of a special device. The friend of her, International flight in the Johnson plane, Bessie, she has been actively engaged in flying."

AVIATION  
November 2, 1959



## KEEP WINTER OUTSIDE THE HANGARS

Hangar heating has been greatly simplified by the use of unit heaters. It is still further simplified when you install Trane Unit Heating, because the complete Trane line of 17 different types and sizes gives you full opportunity to choose exactly the right units required to heat your space properly and without waste.

Experience in hangars where Trane Unit Heaters are installed proves that you can rely on Trane Unit Heating to maintain comfortable working temperatures regardless of outside weather. A scientifically planned installation, recommended by Trane engineers to meet the special requirements of each hangar, places Trane Unit Heaters to deliver a down draft of heated air against the doors, minimizing the rush of cold air when doors open.

Our cost of Trane Unit Heating is 30 to 40% less than cast iron or pipe coil radiation. Operating economies run as high as 35%. Heat control is instantaneous. For complete information, mail the coupon.

## HEAT WITH UNIT HEATERS

**TRANE**  
UNIT HEATING SPECIALISTS

THE TRANE COMPANY, Dept. J-1,  
200 Columbia Avenue, La Grange, Ill.

Send complete information on Trane Unit Heaters for hangars.  
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# IT'S HERE!

## A SUPERIOR



# AVIATION ENGINE OIL . . . UNIFORM THE WORLD OVER

Designed solely for use in the air—a superior new aviation engine oil of absolute uniformity is now offered the flying world. In every section of America—wherever he may land—the flyer will be able to rely on it as an oil of highest quality. Built to fit the exact requirements of his engine.

Stanavo is the name of this new oil. It was developed by the Stanavo Specification Board, an organization of scientists and engineers of the Standard Oil Company of California—Standard Oil Company (Indiana)—Standard Oil Company of New Jersey.



November 1, 1939  
AVIATION  
New York, N.Y.

Month after month during the past year Stanavo has been tested in the laboratory and in the air. Short flights, long flights—tests under varying climatic conditions, altitudes and abnormal loads, different engines and planes—have of late satisfied the Board that the product is right.

Distribution of Stanavo is now being completed. Ask for it by name at all airports and flying fields.

November 1, 1939  
AVIATION  
New York, N.Y.

## STANAVO AVIATION ENGINE OIL

One Brand STANAVO. One Quality  
—the Highest Throughout the World.  
STANAVO SPECIFICATION BOARD, Inc.  
1010 Madison Building—122 West 42nd Street, New York City



**Real Values In Aviators' Winter Equipment**

Complete aeronautical study of your interests. As our position of the world's largest aeronautical supply house, we stock it high up to the minute at all times. We can fill any winter need—and "Ship the Same Day!"

**FLYING SUITS**

MR COMMERCIAL No. 1—Fully worn leather chaps, semi-sugar seat, olive drab color. Lined throughout with heavy felt. Made with lined waist. Balaclava cap. Two zippered pockets. Large pockets on legs. Made of leather. Double stitched and quilt stitched throughout. \$75.00

MR COMMERCIAL No. 2—Same as above except waist has belt girdle long wool sheepskin

No 1 grade. \$85.00  
No 2 grade. \$60.00

ARMY-HAPY No. 1—Heavy flying model and style of heavy grade single Cloth. Made throughout with heavy grade leather. Elevated Landing, similar to that with South American Army. \$100.00

Felts with sheepskin in all sizes from 44  
The best flying suit made in America, recommended  
at present. Cork

ARMY-STAFF No. 2—Same as above, except lined  
with heavy sheepskin waist. \$120.00

Remainder Felt in Temperature Zone,  
Flying Schools and Airports. Write Us



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**AVIATOR'S  
BREECHES****MOCCASINS****XS No. 2—Gum**

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## WINGS that scintillate with color

**T**ODAY, prime factors in the sale of places are: color, beauty, comfort and convenience. Styling has become as essential to aircraft as to modern motor cars.

Progress in the development of aircraft finishes, the du Pont organization is uniquely equipped to render valuable assistance in the important work of aircraft styling. For every part of the ship, du Pont now supplies

finishes especially developed for the air. And the du Pont Color Advisory Service keeps in constant touch with aircraft styling in both America and Europe—offers you expert aid in planning up-to-the-minute color schemes.

Complete information on any du Pont product for airplane use will be furnished either by mail or by a qualified representative.

### AIR-TESTED FINISHES

**De Pint Dyes**—The du Pont line of airtight finishing materials includes dyes, and pigments—especially designed for aircraft. All meet in mind of airtight fabrics—dielectric—proven to serve as well as the famous de Havilland and highly flammable, the Army and Navy aircraft types. Available products for color requirements. Available in a wide variety of highly volatile colors.

**De Pint Paints and Varnishes**—Du Pont chemists have developed a complete line of aircraft materials including: DePintol Paint, DePintol Varnish, DePintol Varnish and Aerovarnish.



E. I. DU PONT DE NEMOURS & CO., Inc.

Industrial Finishes Division, Berlin, N. J.

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## CABINS styled in modern luxury

**I**N the growing competition to give planes greater luxury—distinctive comforts, more refinements—leading manufacturers have recognized the remarkable usefulness of du Pont Fibrelin and Fibrekoid.

Available in various colors and effects, du Pont Fibrelin provides transparent cabin windows, instrument boards and swing lights of ideal strength, lightness and beauty for the modern ship. It offers unlimited

opportunity for original design of fittings. And du Pont Fibrelin solves perfectly the problem of upholstery for modern cabins and cockpits. The new Neosocene Aeroplane Fabrics combine toughness, lightness and grace of design uniquely appropriate in aircraft.

Do Pont technical men will gladly cooperate with you in specifying and designing. Write to us or call the division listed below.



E. I. DU PONT DE NEMOURS & CO., Inc.

DU PONT VISCOCOLOID CO., Inc.

350 Fifth Avenue, New York City

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### AIR-TESTED MATERIALS

**De Pint Fibrelin**—dually Fibrelin is an airtight material. It resists oxygen, water, oil, heat, cold and sunlight with distinction. Neosocene Aeroplane Fabrics are new type, light weight materials developed for the modern aircraft. They are made of Neosocene which is woven from both a woven web and a woven web of polyethylene. Fibrelin is dimensionally permanent.

**De Pint Fibrelin**—A strong, durable, light, waterproof, compressible material intended to be draped from a frame or spread in sheets approximately four to six feet. Ideal for window shades, valances, window curtains, running lights and other uses.

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# JUDGMENT

**I**N THESE DAYS of hectic competition in the air, sound business judgment is just as important as engineering skill and experience. That is why the background of the Buhl Aircraft Company—almost a century of recognized leadership in the many fields with which the name has been identified—assures you that the future of Buhl Airsedans will be as brilliant as the present record they are making above the clouds. Several attractive dealer franchises are still available.

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The Spartan School of Aeronautics is one of the few American schools of aviation with official approval and recognition from the United States Department of Commerce. This means that the Spartan school has maintained high standards in both policy and practice. The Spartan course is complete, instructors are men of exceptional character and ability, equipment and facilities meet the most exacting requirements. Spartan is one of the few schools offering that point of development necessary to such distinction.

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COMPLETE TO THE SMALLEST DETAIL

Subjects covered in the ground school include: Air Commerce Rules and Regulations, Home-structure (Aeronautical Terms), Airplane Theory and Shop, Motor Theory and Shop, Navigation, Meteorology, Parachutes, Radio, Instruments, Advertising, Sales, Factory Methods (All ground instructors licensed by U. S. Department of Commerce.)

**FLIGHT EQUIPMENT AND TRAINING . . .**  
Modern commercial ships insure flight



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Southwest Air Mail Express is one of the principal passenger-carrying lines in America, operating a fleet of trans-continental mail planes throughout the southwest. By special arrangement the Spartan school will pay the air transportation fare from any city shown on the map below to Tulsa, via S.A.M.E., for any student who enrolls in the Transport Pilot or Unlined Commercial course at the Spartan school. For those enrolling in the Merchant or Private Pilot course, Spartan will pay half the air transportation fare from any city shown on the map.

Write for your copy of pamphlet entitled, "Today's Transportation," and information concerning our offer to pay the air transportation fare for students enrolling in the Spartan school.

**SPARTAN SCHOOL OF AERONAUTICS**  
TULSA, OKLAHOMA

S.A.P.E. operates also at Atlanta, Peoria, Oneonta, and a dozen cities taking on passengers and baggage for the trip to St. Louis via Tulsa.



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SPARTAN AIRCRAFT COMPANY has added to its organization a new class of specialists . . . men who conceive on paper an airplane with surfaces so proportioned and weights so balanced as to insure maximum performance in flight with utmost safety in operation . . . men who understand quality of metal and how to utilize its greatest strength without an ounce of surplus weight . . . men who know tree-grain timber and its proper stage of seasoning . . . and men with long experience in the application of important fabric surfaces.

With such an organization of master craftsmen and engineers Spartan is producing an airplane of outstanding dependability and performance . . . an airplane that is distinguished from all others by Engineering. . . .

A. T. C. No. 151, presented by the Wright Whirlwind Flyer will be sent on request.

**SPARTAN AIRCRAFT COMPANY**  
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Photo by Moline Air Shipping Co.

## The Monocoach

### WELCOMES COMPARISON

In performance—comfort—dependability—luxury and VALUE, the new Monocoach welcomes comparison with all other quality passenger aircraft. Nothing else will give so completely—so compactly—the luxury of this fine passenger cabin plane.

Altogether designed and engineered especially to meet the growing demand of the private flier for a family and guest plane, the Monocoach has proven itself invaluable for business and passenger service. Powered by the Wright "W.W.J. 46," it has an excess of reserve power and a speed of 155 miles per hour.

Is offered at about two-thirds the cost of the slightly larger cabin planes and approximately the same price as the conventional open three place biplane, equipped with engines of less horsepower.

Price \$4,230 flyaway Moline, Ill.

#### Specifications and Performance Data

With main monocoque cabin	4 place enclosed cabin
Length	36' 6" overall
Width	10' 6" overall
Height	6' 6" overall
Wing area	202 sq. ft.
Wing loading	1.01 sq. ft.
Power and load	460 h.p. and 1,100 lbs.
Fuel Capacity	40 gallons
Engines	Wright "W.W.J. 46"
Propellers	3-blade
Landingspeed	48 M.P.H.
Max. speed	155 M.P.H.
Service ceiling	13,000 ft.
Cruising speed	117 M.P.H.
Cabin interior	12' 0" long x 4' 0" wide x 4' 0" high
Cabin容积	21.0 cu. ft.
Cabin pressure	1.000 lbs.
Cabin dimensions	1.000 lbs.



Dual Control, Biplane or Biwing, and Small Propeller, Engine Service, Knuckle wheels and tires, Split upper landing gear, Galloping sheath series, Navigation lights, Power Camera and Air Speed Indicator, Thermos, Peer oil pressure, Corrosion Resistant, Lubrication Board.

Department of Commerce Certificate of Approval  
November 201

**MONO AIRCRAFT CORP., MOLINE, ILLINOIS**  
Builders of the *Mesoscope*, *Monoprep*, and *Monocoach*

## KEYSTONE-LOENING AMPHIBIAN 'AIR YACHT'



Large ship—The New York & Southern Airlines fleet of four Keystone-Loening Air Yachts of the South Woods Migrant of New York Air Transport, Inc. Authoritative photo by Spofford, Inc. Small ship—One of the boats.

### 3 HOURS PER DAY PER SHIP—AT A PROFIT

The suitability of Keystone-Loening Air Yachts for port-to-port charter service has been clearly established in the operations of the New York & Southern Airlines. Under the direction of Captain Harry C. Trenholme, authorative photo by Spofford, Inc., has conducted with a fleet of four Cyclone-powered Air Yachts from the base of the N.Y.A.T. Airport at North Beach, New York City.

Trips to Meno, the upper St. Lawrence and other distant points were made regularly, supplemented by "seach hopping" to points not then reached. The average time in the air—3 hours per ship per day—was 300 per ship per day, or 1,200 per day. Keystone averaged \$20 per head per day, including all expenses. Flying, while special work often brought as high as \$600 per head, during one 60-day period the four Air Yachts earned \$28,000.

The management of the line has especially stated: (1) the distinctive performance of their aircraft for operations over land or sea planes; (2) the remarkable delight of the passengers in the comfort and safety flight of the Air Yacht; (3) the easy handling of Keystone-Loening Air Yacht by the beach crew; (4) the advantage of the ship which can be easily put into service during heavy duty; (5) the low cost of operation and maintenance cost.

This is another striking example of how Keystone-Loening Air Yachts assist the transport operator to success.

6 to 16 passengers • 525 H.P. • 160 M.P.H. Cruising • 227,500



**KEYSTONE AIRCRAFT CORPORATION**  
FLIGHT DEPT.—100 EAST 42nd STREET, NEW YORK  
PLANE—DEIESTER, PENNSYLVANIA, AND NEW YORK CITY

## **Another Airport Recommends Stanolind Aviation Products**

Mr. L. J. Thompson, Manager  
Standard Oil Company, (Indiana)  
Grand Rapids, Michigan  
Dear Sir:

Dear Sir:

Explosive fuel and lubrication are of utmost importance, hence this letter of appreciation. We selected Staniland Motor Oil and Aviation Gasoline for the near perfect, we think, as engineers are able to make them. All our flying is done with your products.

Very truly yours,  
John C. Morris  
John C. Morris, Inc.

We also wish to thank you and your organization for the courtesy and service extended to us all times and will highly recommend Standard Aviation and Gasoline and Aero Oils to all pilots and airports.

WE ARE VERY TROULY,  
ALLEN FLYING SERVICE  
RAY E. Allen

TODAY Stanolind Aviation Gasoline and Aero Oils are well known at midwestern airports and preferred by the majority of pilots. These men know that they can rely on the supreme quality of Stanolind Aero Products as their best insurance against engine trouble.

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General Office: 910 South Michigan Ave.

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- designing hangars* . . . . .
- ventilating them* . . . . .
- daylighting them* . . . . .
- selecting suitable materials* . .
- eliminating rust and corrosion*

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Has the Experience

YOUR hangars can be either a source of economy to you . . . or they can eat into the money you should use for planes and motors. They can be either the trouble-free kind that never cost a thought . . . or they can be the kind that keep workmen forever busy with paint pot or repair. They can cost you too much money to build . . . or they can cost you too little to do their job effectively.

Do you know how much a banger should cost? Do you know what materials are best for them? Do you know the cheapest and most effective ways to daylight them? Do you know whether the design of your banger is going to have any effect on the removal of carbon monoxide gas?

Robertson engineers have been dealing with these and a thousand other questions affecting hangars all over the world.

Bring your problems to them. Let them look over your blueprints. Their suggestions will not cost you anything and will not oblige you.

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**WACO "221" TAPER-WING**  
Type Certificate No. 121  
Type: Single, two-bay, two-seat open cockpit biplane.  
Engines: 200 h.p. Hispano-Suiza, 100 h.p. Gnome.  
Performance: Top speed - 120 miles per hour  
cruising speed - 110 miles per hour. Range - 250 miles  
endurance, normal fuel consumption - 11  
gallons per hour.  
Equipment: Complete instruments, altimeter, oil  
pressure and temperature gauges, air speed  
indicator, compass, oil pressure gauge, fuel  
instruments, etc.  
Price of aircraft, \$10,000.00



**WACO "221" STRAIGHT-WING \***  
Type: Single, side control, open cockpit biplane.  
Engines: 200 h.p. Hispano-Suiza "Whitworth".  
Performance: Top speed - 120 miles per hour  
cruising speed - 110 miles per hour. Range - 250 miles  
endurance, normal fuel consumption - 11  
gallons per hour.  
Equipment: Complete instruments, altimeter, oil  
pressure and temperature gauges, air speed  
indicator.  
Price of aircraft, \$10,000.00

# New, improved, yet tested by time

TODAY, two new and improved WACOS are ready to carry on the reputations of two famous predecessors. These dependable ships, each powered by the new "Taper-Wing" motor, set even higher standards of performance.

At the controls of the new WACO "221" Taper-Wing, you take off and climb 1500 feet a minute. You get instant response at the slightest pressure on stick and rudder. You find out what real controllability is. And in the new WACO "221" Straight-Wing, you have stability, balance and ease of handling that you can't "hand off" after indefinitely.

Here are new shapes. Here's a new motor. But... both plane and power plant are developed from proved designs. Both are tested by time.

Check the specifications. Note the moderate prices. Then write for further details about these and the other WACO models, and arrange for a flight. Find out for yourself why WACO has the largest following of enthusiastic owners in America.

THE WACO AIRCRAFT COMPANY  
Troy, Ohio



"In any Pilot"

"This is the ship that won the recent National Air Tour with a perfect score for every leg."

**COMPARE THIS PERFORMANCE.  
WITH THAT OF ANY  
OTHER TRANSPORT!**



THE NEW BOEING MODEL 80-A TRANSPORT

**T**HIS eighteen passenger, 750-miler Transport incorporates features developed by seven million miles flown by Boeing System in Boeing planes. Tests with full load have proved its superiority in performance under varied conditions of altitude and temperature. It is swift, easily maneuverable, economical to operate and comfortable to ride in.

Offering it commercially to the domestic and foreign market is the belief of America's largest airplane manufacturer that Model 80-A is the best Transport of its type built.

Complete information will be sent upon request.

**BOEING AIRPLANE COMPANY**  
Division of United Aircraft & Transport Corporation  
SEATTLE, WASHINGTON



**PERFORMANCE**

Diving Model 80-A with full load?

From high speed in a steep, spiraling dive  
at 15,000 feet, altitude plane reaches 5,000 feet in  
less than 10 seconds.

Speed Take-off: Landing: 50' off of 150'.

Altitude: 10,000 feet in 10 minutes.

Altitude: 15,000 feet in 15 minutes.

Altitude: 18,000 feet in 20 minutes.

Altitude: 20,000 feet in 25 minutes.

Altitude: 22,000 feet in 30 minutes.

Altitude: 24,000 feet in 35 minutes.

Altitude: 26,000 feet in 40 minutes.

Altitude: 28,000 feet in 45 minutes.

Altitude: 30,000 feet in 50 minutes.

Altitude: 32,000 feet in 55 minutes.

Altitude: 34,000 feet in 60 minutes.

Altitude: 36,000 feet in 65 minutes.

Altitude: 38,000 feet in 70 minutes.

Altitude: 40,000 feet in 75 minutes.

Altitude: 42,000 feet in 80 minutes.

Altitude: 44,000 feet in 85 minutes.

Altitude: 46,000 feet in 90 minutes.

Altitude: 48,000 feet in 95 minutes.

Altitude: 50,000 feet in 100 minutes.

Altitude: 52,000 feet in 105 minutes.

Altitude: 54,000 feet in 110 minutes.

Altitude: 56,000 feet in 115 minutes.

Altitude: 58,000 feet in 120 minutes.

Altitude: 60,000 feet in 125 minutes.

Altitude: 62,000 feet in 130 minutes.

Altitude: 64,000 feet in 135 minutes.

Altitude: 66,000 feet in 140 minutes.

Altitude: 68,000 feet in 145 minutes.

Altitude: 70,000 feet in 150 minutes.

Altitude: 72,000 feet in 155 minutes.

Altitude: 74,000 feet in 160 minutes.

Altitude: 76,000 feet in 165 minutes.

Altitude: 78,000 feet in 170 minutes.

Altitude: 80,000 feet in 175 minutes.

Altitude: 82,000 feet in 180 minutes.

Altitude: 84,000 feet in 185 minutes.

Altitude: 86,000 feet in 190 minutes.

Altitude: 88,000 feet in 195 minutes.

Altitude: 90,000 feet in 200 minutes.

Altitude: 92,000 feet in 205 minutes.

Altitude: 94,000 feet in 210 minutes.

Altitude: 96,000 feet in 215 minutes.

Altitude: 98,000 feet in 220 minutes.

Altitude: 100,000 feet in 225 minutes.

Altitude: 102,000 feet in 230 minutes.

Altitude: 104,000 feet in 235 minutes.

Altitude: 106,000 feet in 240 minutes.

Altitude: 108,000 feet in 245 minutes.

Altitude: 110,000 feet in 250 minutes.

Altitude: 112,000 feet in 255 minutes.

Altitude: 114,000 feet in 260 minutes.

Altitude: 116,000 feet in 265 minutes.

Altitude: 118,000 feet in 270 minutes.

Altitude: 120,000 feet in 275 minutes.

Altitude: 122,000 feet in 280 minutes.

Altitude: 124,000 feet in 285 minutes.

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Altitude: 130,000 feet in 300 minutes.

Altitude: 132,000 feet in 305 minutes.

Altitude: 134,000 feet in 310 minutes.

Altitude: 136,000 feet in 315 minutes.

Altitude: 138,000 feet in 320 minutes.

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Altitude: 142,000 feet in 330 minutes.

Altitude: 144,000 feet in 335 minutes.

Altitude: 146,000 feet in 340 minutes.

Altitude: 148,000 feet in 345 minutes.

Altitude: 150,000 feet in 350 minutes.

Altitude: 152,000 feet in 355 minutes.

Altitude: 154,000 feet in 360 minutes.

Altitude: 156,000 feet in 365 minutes.

Altitude: 158,000 feet in 370 minutes.

Altitude: 160,000 feet in 375 minutes.

Altitude: 162,000 feet in 380 minutes.

Altitude: 164,000 feet in 385 minutes.

Altitude: 166,000 feet in 390 minutes.

Altitude: 168,000 feet in 395 minutes.

Altitude: 170,000 feet in 400 minutes.

Altitude: 172,000 feet in 405 minutes.

Altitude: 174,000 feet in 410 minutes.

Altitude: 176,000 feet in 415 minutes.

Altitude: 178,000 feet in 420 minutes.

Altitude: 180,000 feet in 425 minutes.

Altitude: 182,000 feet in 430 minutes.

Altitude: 184,000 feet in 435 minutes.

Altitude: 186,000 feet in 440 minutes.

Altitude: 188,000 feet in 445 minutes.

Altitude: 190,000 feet in 450 minutes.

Altitude: 192,000 feet in 455 minutes.

Altitude: 194,000 feet in 460 minutes.

Altitude: 196,000 feet in 465 minutes.

Altitude: 198,000 feet in 470 minutes.

Altitude: 200,000 feet in 475 minutes.

Altitude: 202,000 feet in 480 minutes.

Altitude: 204,000 feet in 485 minutes.

Altitude: 206,000 feet in 490 minutes.

Altitude: 208,000 feet in 495 minutes.

Altitude: 210,000 feet in 500 minutes.

Altitude: 212,000 feet in 505 minutes.

Altitude: 214,000 feet in 510 minutes.

Altitude: 216,000 feet in 515 minutes.

Altitude: 218,000 feet in 520 minutes.

Altitude: 220,000 feet in 525 minutes.

Altitude: 222,000 feet in 530 minutes.

Altitude: 224,000 feet in 535 minutes.

Altitude: 226,000 feet in 540 minutes.

Altitude: 228,000 feet in 545 minutes.

Altitude: 230,000 feet in 550 minutes.

Altitude: 232,000 feet in 555 minutes.

Altitude: 234,000 feet in 560 minutes.

Altitude: 236,000 feet in 565 minutes.

Altitude: 238,000 feet in 570 minutes.

Altitude: 240,000 feet in 575 minutes.

Altitude: 242,000 feet in 580 minutes.

Altitude: 244,000 feet in 590 minutes.

Altitude: 246,000 feet in 600 minutes.

Altitude: 248,000 feet in 610 minutes.

Altitude: 250,000 feet in 620 minutes.

Altitude: 252,000 feet in 630 minutes.

Altitude: 254,000 feet in 640 minutes.

Altitude: 256,000 feet in 650 minutes.

Altitude: 258,000 feet in 660 minutes.

Altitude: 260,000 feet in 670 minutes.

Altitude: 262,000 feet in 680 minutes.

Altitude: 264,000 feet in 690 minutes.

Altitude: 266,000 feet in 700 minutes.

Altitude: 268,000 feet in 710 minutes.

Altitude: 270,000 feet in 720 minutes.

Altitude: 272,000 feet in 730 minutes.

Altitude: 274,000 feet in 740 minutes.

Altitude: 276,000 feet in 750 minutes.

Altitude: 278,000 feet in 760 minutes.

Altitude: 280,000 feet in 770 minutes.

Altitude: 282,000 feet in 780 minutes.

Altitude: 284,000 feet in 790 minutes.

Altitude: 286,000 feet in 800 minutes.

Altitude: 288,000 feet in 810 minutes.

Altitude: 290,000 feet in 820 minutes.

Altitude: 292,000 feet in 830 minutes.

Altitude: 294,000 feet in 840 minutes.

Altitude: 296,000 feet in 850 minutes.

Altitude: 298,000 feet in 860 minutes.

Altitude: 300,000 feet in 870 minutes.

Altitude: 302,000 feet in 880 minutes.

Altitude: 304,000 feet in 890 minutes.

Altitude: 306,000 feet in 900 minutes.

Altitude: 308,000 feet in 910 minutes.

Altitude: 310,000 feet in 920 minutes.

Altitude: 312,000 feet in 930 minutes.

Altitude: 314,000 feet in 940 minutes.

Altitude: 316,000 feet in 950 minutes.

Altitude: 318,000 feet in 960 minutes.

Altitude: 320,000 feet in 970 minutes.

Altitude: 322,000 feet in 980 minutes.

Altitude: 324,000 feet in 990 minutes.

Altitude: 326,000 feet in 1,000 minutes.

Altitude: 328,000 feet in 1,010 minutes.

Altitude: 330,000 feet in 1,020 minutes.

Altitude: 332,000 feet in 1,030 minutes.

Altitude: 334,000 feet in 1,040 minutes.

Altitude: 336,000 feet in 1,050 minutes.

Altitude: 338,000 feet in 1,060 minutes.

Altitude: 340,000 feet in 1,070 minutes.

Altitude: 342,000 feet in 1,080 minutes.

Altitude: 344,000 feet in 1,090 minutes.

Altitude: 346,000 feet in 1,100 minutes.

Altitude: 348,000 feet in 1,110 minutes.

Altitude: 350,000 feet in 1,120 minutes.

Altitude: 352,000 feet in 1,130 minutes.

Altitude: 354,000 feet in 1,140 minutes.

Altitude: 356,000 feet in 1,150 minutes.

Altitude: 358,000 feet in 1,160 minutes.

Altitude: 360,000 feet in 1,170 minutes.

Altitude: 362,000 feet in 1,180 minutes.

Altitude: 364,000 feet in 1,190 minutes.

Altitude: 366,000 feet in 1,200 minutes.

Altitude: 368,000 feet in 1,210 minutes.

Altitude: 370,000 feet in 1,220 minutes.

Altitude: 372,000 feet in 1,230 minutes.

Altitude: 374,000 feet in 1,240 minutes.

Altitude: 376,000 feet in 1,250 minutes.

Altitude: 378,000 feet in 1,260 minutes.

Altitude: 380,000 feet in 1,270 minutes.

Altitude: 382,000 feet in 1,280 minutes.

Altitude: 384,000 feet in 1,290 minutes.

Altitude: 386,000 feet in 1,300 minutes.

Altitude: 388,000 feet in 1,310 minutes.

Altitude: 390,000 feet in 1,320 minutes.

Altitude: 392,000 feet in 1,330 minutes.

Altitude: 394,000 feet in 1,340 minutes.

Altitude: 396,000 feet in 1,350 minutes.

Altitude: 398,000 feet in 1,360 minutes.

Altitude: 400,000 feet in 1,370 minutes.

Altitude: 402,000 feet in 1,380 minutes.

Altitude: 404,000 feet in 1,390 minutes.

Altitude: 406,000 feet in 1,400 minutes.

Altitude: 408,000 feet in 1,410 minutes.

Altitude: 410,000 feet in 1,420 minutes.

Altitude: 412,000 feet in 1,430 minutes.

Altitude: 414,000 feet in 1,440 minutes.

Altitude: 416,000 feet in 1,450 minutes.

Altitude: 418,000 feet in 1,460 minutes.

Altitude: 420,000 feet in 1,470 minutes.

Altitude: 422,000 feet in 1,480 minutes.

Altitude: 424,000 feet in 1,490 minutes.

Altitude: 426,000 feet in 1,500 minutes.

Altitude: 428,000 feet in 1,510 minutes.

Altitude: 430,000 feet in 1,520 minutes.

Altitude: 432,000 feet in 1,530 minutes.

Altitude: 434,000 feet in 1,540 minutes.

Altitude: 436,000 feet in 1,550 minutes.

Altitude: 438,000 feet in 1,560 minutes.

Altitude: 440,000 feet in 1,570 minutes.

Altitude: 442,000 feet in 1,580 minutes.

Altitude: 444,000 feet in 1,590 minutes.

Altitude: 446,000



*Developed for Safety with Performance*

Brunner-Winkle Aircraft Corporation  
1-17 Haviland St., Dept.  
Glendale, Brooklyn, N. Y.



## Consolidated Instruments Help Waco Planes Win Tour



Congratulations to John Livingston and Arthur Davis, who piloted Waco straight wing F-6 300's equipped with specially constructed Consolidated instruments in placing first and second, respectively, in the Annual National Air Tour held in October for the Edsel Ford Reliability Trophy.

**CONSOLIDATED  
INSTRUMENTS**

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# WHAT KIND OF HANGAR SHALL WE ERECT?



*That's the question*



HERE'S THE ANSWER TO THESE QUESTIONS

## Firesafe



**BLAW-KNOX  
STEEL  
HANGARS**

There's no longer doubt as to what's been causing those dead trees in White-Mesa, NEW MEXICO. You know you can enlarge it or move it to a new location—just know it will soon bring its retribution because it is made of copper bear the greatest load and offers the maximum resistance to weather and erosion. It makes all larger problems of the person who acquires the property. It is not only less portable and does not allow you to move you may be forced to abandon without notice. Ask our nearest distributor for complete data.

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# BLAWKNOX



Three Efficiency Trophies are at Cleveland National Air Races, 1925, by Efficiency Award. At left, Airplane Types and Country Club Trophy. Center, Cleveland Institute Efficiency Trophy. At right, Detroit Motor Air Transport Trophy.

## A Pacemaker for Sales!



**T**HREE is no stamp on Bellanca Sales! Very much to the contrary, sales of the new type Bellanca Flying public has been unceasing since it was first shown at the Cleveland races.

Among the purchases of the Bellanca Products, during the first thirty days following its public appearance, are—Eastern Air Express for the New York to Miami service, Irving Air Charter Co., B. G. Van Andrade, of Boston, Compania Aerea Honduras, a United Press subscriber, of Tela, Honduras, Lloyd Campbell, of Kansas City, Inter-Island Airways, Ltd., Honolulu, Alaska Transp. Co., of Anchorage, Alaska, McCoy, Floyd L., Los Angeles, Hulley Aviation Management, Inc., Omaha, and A. M. Thurmond, of Kansas City. Several of these purchases were first trials, but others are Patrons.

**Alumina GH 300 or "Furnasite" Specimens** The plate morphology. Dual oriented Lattice constant approximated. Strength at 15% greater than that of *Constituents* specimens. Lattice constant = High, most 145  $\text{m} \cdot \text{pm}^{-1}$  (using sped. 100  $\text{m} \cdot \text{sec}^{-1}$ ). Peaked with a 1000  $\text{m} \cdot \text{sec}^{-1}$ . Peak maxima of both curves at 1000  $\text{m} \cdot \text{sec}^{-1}$ .

**Boeing**—High speed 120 m.p.h. climbing speed, 12 m.p.m. Payload (passenger) 1,000 lbs. The Boeing 747 has been U. S. Dept. of Commerce Approved Type Certificate No. 141. The **Transamerica** **Flamingo**. Dual control 24 cu. ft. It closed freight compartment 2 passenger and luggage compartment. Painted twin panel 1,200 lbs. U. S. Dept. of Commerce Approved Type Certificate No. 141.

# BELLANCA

## 20 Lives Saved In 20 Seconds



The Aerial Life Saving  
Sensation of the Age

Floyd Smith

### SAFETY SEAT

Every Transport—every commercial plane should have adequate life saving equipment.

The SAFETY SEAT is a comfortable chair that in the unlikely event an air car can be transformed into a life saving parachute, without the passenger moving from the chair.

Twenty passengers can be dropped safely through the bottom of the plane in 20 seconds, to float gently to earth.

Safe tests, made by dropping several passengers in the SAFETY SEAT from a fast spin, proved the sure action of the SAFETY SEAT in saving what the angle of flight.

Pull around our new safety opening SAFETY PACK—  
pull around our new Safety Test—the SAFETY SEAT is positive—  
it brings life saving certainty to aviation.

Please, manufacturers, and Air Line operators are invited to write for interesting data on equipping their planes with SAFETY SEATS.

Some exclusive territories open to live dealers.

**SWITLIK MANUFACTURING CO.**

Bread and Dye Sta.

A detailed description of the  
SAFETY SEAT and SAFETY PACK  
will be sent you free on request.

Subscriptions: Home Stations  
\$10.00 per year. Foreign \$12.00 per year.  
Safety Seats \$10.00 per year.



Trenton, N. J.

## Our Congratulations To Waco and Winning Pilots

PLATES ARE PREPARED TO HONOR THE COMPANY OR INDIVIDUALS AND PERSONS CONCERNED IN THE WINNERS

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WE CONGRATULATE YOU ON QUALITY OF YOUR PRODUCT. PLANES DON'T  
BREAK AND DURABILITY IS FANTASTIC

WACO AIRCRAFT CO. LTD.

WE GUARANTEE DURABILITY AND INTEGRITY TO 100% WHICH IS BY FAR THE BEST IN THE FIELD.

again TITANINE dopes and lacquers  
prove all-weather durability—

The Waco J-6 30% which placed first and second in the  
Annual National Air Tour held in October for the Edsel  
Ford Reliability Trophy demonstrated again the durability  
of Titanine standard airplane finishes. We congratulate  
the Waco Aircraft Co. and the winning pilots, John  
Livingston and Arthur J. Davis, on their victory.

The Titanine products used on the Waco planes are TITANINE  
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For sky is high and  
airplane finishes  
and finishes  
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parts. It is  
the only  
airplane  
finishes  
available.

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STANDARD AIRPLANE FINISHES SINCE 1913

# Speaking of Reliability...

**A Robin tours**

**101**

**CITIES**

**46**

**STATES**

**12,000**

**MILES**

**Always on  
Time**



*No better place than the Robin is made for the severe tests of aerobatic instruction flying.*

**A CURTISS-ROBIN** recently toured the country on a scheduled business trip. The itinerary called for the visiting of 101 cities in 46 states... and a complete coverage of the United States.

Normally of levels of weather... every flying condition... every type of engine was experienced. Desert heat and mountain cold... for weather and climate 36 states were covered. And the Robin could be depended on to show the flying and endurance qualities of a plane and engine.

And throughout this whole trip the Robin was on unshaded roads in



*For short or long distances, few aircraft have established our Robin's just reliability... few will find Robin's doing these distances... thoroughly... with a minimum of mishaps.*

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Yet this performance is just one of many that Robins all over the world are putting daily. Outstanding proof of the remarkable dependability and operating economy of these smaller types of aircraft is the record of the World's Endurance Record.

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The ruggedness of construction,凭  
仗于 of design... inherent stability... high visibility, and cabin comfort and spaciousness breed confidence and enthusiasm pilot endurance.

A word from your distributor or manufacturer of Robins and the location of the nearest Curtiss-Briggs dealer will teach you immediately. At the field you can see it... and fly it. Write Dept. 100, Curtiss-Wright Flying Service, 27 W. 37th St., New York City.

**CURTISS-WRIGHT FLYING SERVICE**

A DIVISION OF CURTISS-WRIGHT CORPORATION

*"World's Oldest Flying Organization"*



*Preparing and practicing a flight of Robins in all places at one of the Curtiss-Briggs Flying Schools.*

## Move the Bench Not the Job



*Patent Pending*

## "Hallowell" Semi-Portable Work-Bench of Steel

A Semi-Portable Work Bench on two casters— one you can handle around loose in place, from job to job—how does that strike you?

Before the "HALLOWELL" Semi-Portable of Steel a work bench was a fixture—either in position, or taken apart and moved.

Now we work with the "HALLOWELL"—grind the handles and handle Bench and all to where you want it.

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Now you can purchase your plane out of income in Colonial Dealers—through arrangements made with Aviation Credit Corporation—offer a new aircraft time-payment plan. The cost of a plane with complete insurance coverage is financed by Aviation Credit in just as simple a manner as in buying an automobile on time.

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for now he can have his own ship much sooner than he has anticipated and at a lower original investment.

The line of planes distributed by Colonial Flying Service throughout New York State and New England includes such well known makes as FAIRCHILD—CHALLENGER—FLEET—PITCAIRN and STANDARD.

Colonial district sales offices are located at Boston, Buffalo, Hartford and Schenectady. Service facilities are also available at Newark, Albany, Utica, Rochester, Cleveland, Toronto and Montreal.

A few territories are still open for the appointment of a Colonial dealer. For complete information write to Colonial Flying Service, Inc., 270 Madison Avenue, New York City.

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DIVISION • OF • THE • AVIATION • CORPORATION

"You're flying 20 feet too low!"



this amazingly accurate altimeter  
warns you . . . . . instantly!

You might lose a hundred feet in altitude and never know it, with the ordinary altimeter.

But the instant you vary as little as fifteen or twenty feet above or below your set elevation, you receive an immediate warning from the Paulin Level Flight and Altitude Indicator.

It's a new instrument... rendering a new service... setting a new standard of accuracy. It is an important contribution to the safety of the airways... for now, in blind or night flying, the pilot can set and maintain a safe altitude above all known obstructions. Even with all landmarks obscured he can still measure



absolutely level flight by watching the balance indicator on his Paulin Altimeter.

Now that flyers are receiving radio messages and up-to-the-minute meteorological data, it is possible to correct the reading as now with a barometric adjustment to correspond with weather conditions at destination. This especially assures control that permits, for the first time, a dependable, accurate check on flight tests.

For the safety of your ships you should send coupon for full information about this instrument, which takes all the space and can be quickly checked to set instrument board.

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LEVEL FLIGHT  
and ALTITUDE INDICATOR

Manufactured by the American Paulin System, Inc., subsidiary of the General Instrument Corporation, Manufacturing Laboratories of 1918 Maple Ave., Los Angeles, California

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THE MATERIAL OF **1,000,000** USERS

# AIRCRAFT TURNBUCKLES

## Commercial Specifications:

Bronze Barrel with ends made from 35% Nickel Steel, heat treated. CADMIUM PLATED.

Abbreviations used as follows:—SF Short Female; SM Short Male; LF Long Female; LM Long Male; SWF Short Female with Wide Seat; LFW Long Female with Wide Seat; SFF Short Female, Female both ends; LFF Long Female, Female both ends.

Grade	Barrel	Length	Length	Ends	Seat	Size	Barrel	Size	Price
2141P	154	216	216	156	156	156	154	154	\$0.36
2141P	154	476	476	156	156	156	154	154	\$0.36
2141M	154	216	216	156	156	156	154	154	\$0.36
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2141P	154	216	216	156	156	156	154	154	\$0.36
2141M	154	216	216	156	156	156	154	154	\$0.36
2141P	154</td								



## 52 TONS IN 50 SECONDS



WERE LIFTED BY THE  
**SIEMEN'S** BUILT ENGINES  
POWERING THE DORNIER Do. X.  
IN ITS EPOCHAL FLIGHT WITH  
169 PERSONS. SIEMEN'S DEPEND-  
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HANGARS . . . .

**FIRE & LIGHTNING PROOF—  
MODERN—DAYLIGHT—  
ECONOMICAL—  
CLEAR SPAN—  
FULL WIDTH STEEL DOORS—  
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HEADACHES"

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Show the steady progressiveness. The American Transport is built for years of service. The nose bridge is bowed. The inferior endures no wear. All parts are made of leather, cotton and leather can be removed and replaced with the fingers. No tools needed.

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Let **RED WING** supply  
you with **AMERICAN  
TRANSPORT** aviation goggles



Order now  
from  
RED WING FLYING SERVICE, INC.

These goggles have been up 25,000 feet  
and not fog. Every feature in these  
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designed in the laboratories of American  
Optical Company, give full clarity of vis-  
ion and will not cause eye strain. They  
are particularly well suited for use in  
Army, Navy and Marine Corps, and other  
military and naval services.

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Patent  
Pending

AMERICAN TRANSPORT  
AVIATION GOGGLE

*An AMERICAN OPTICAL COMPANY product*

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**Finishing FOKKER wing parts**  
No. 5-6 winter weight. Blue Rayon and Crease  
Taffeta lining. High-quality wool fabric in the front. It weighs  
less than 1/2 lb. per square yard. It is available with a combination  
of leather or cloth. The leather features  
a soft, supple, supple leather  
and various colors. Colors of  
gold, tan, (When ordering  
state bright and dark tan.)

**\$67.50**

No. V-22 Khol cloth, water-  
proofed, otherwise same as  
V-36. **\$50.00**

No. V-38 Khaki cloth, water-  
proofed, wool blanket lined.  
Unlined dueling collar  
**\$25.00**

No. V-36 winter weight. Black, chocolate color  
leather, sheepskin lining. Each, **\$80.00**



*Khol Cloth  
Flight Suit  
Accessories*

*Black, Chocolate  
Color*

*Sheepskin Lining*

*Each \$80.00*

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**PORT-A-CABLE**  
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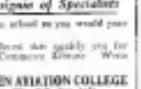
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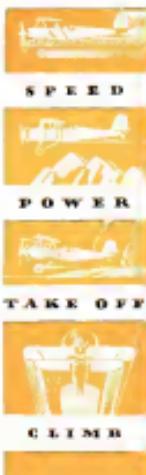
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